IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication JUNE 22, 1961

Metalworking's Technological Explosion

A New Series Beginning With:

Metals and Materials for the Future p. 115

Why Engineer Shortage Grows p. 85

Computers Talk Shop Language p. 127

Digest of the Week p. 2-3

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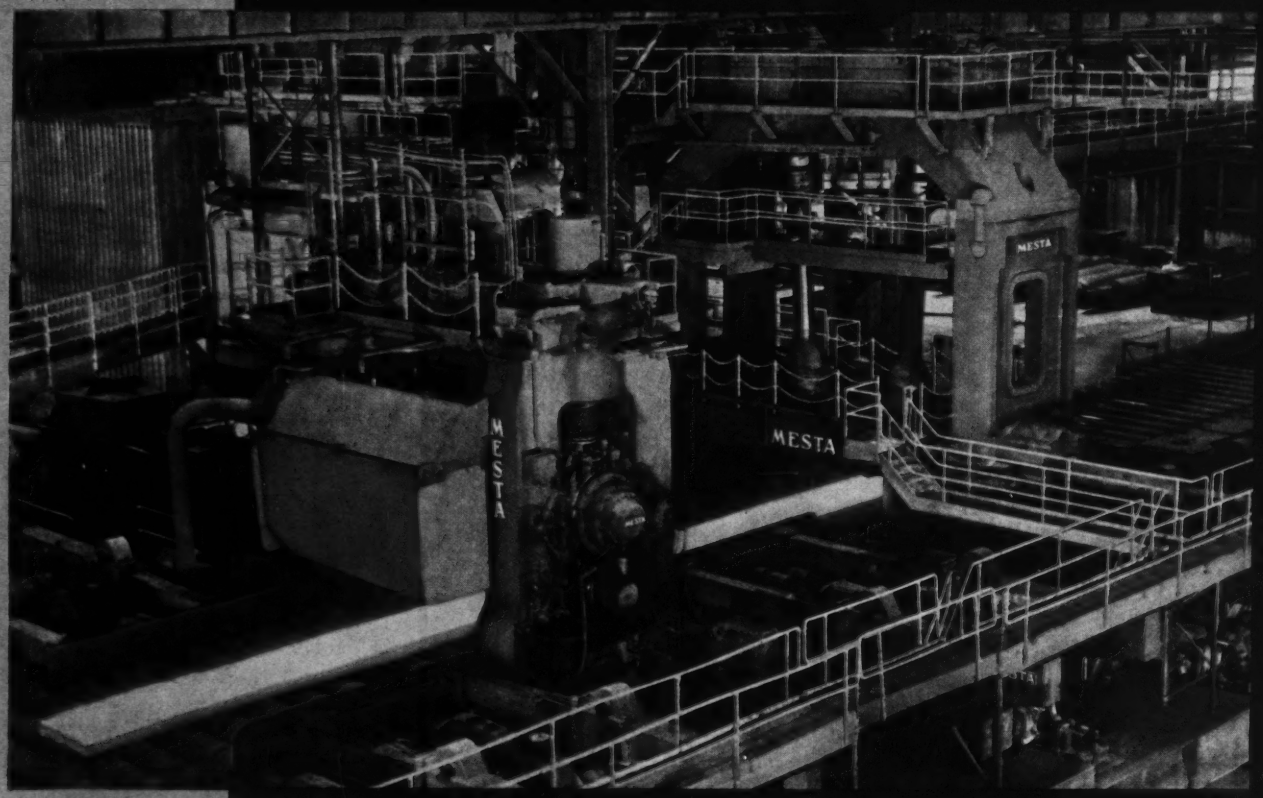

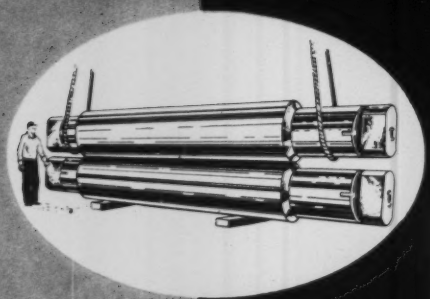

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Tool Steel Topics

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Auto fenders trimmed with dies made from water-hardening tool steel

These photographs, taken at Mardigian Corporation, Warren, Mich., show the use of Bethlehem carbon water-hardening tool steel in trim dies for automobile front fenders. The dies, hardened to Rockwell C 62-64, trim 20-gage cold-rolled sheet steel. In the picture above, 15 sections of the tool steel, bolted into the casting, are ready for "Kellering." The companion picture was taken after the tool steel sections were machined to contour and heat-treated, making a completed form-and-trim die.

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By removing the feather-edge before a tool is placed in service, the user is assured of increased production because the edges of the tool do not dull as rapidly.

THE IRON AGE, Chestnut & 56th Sts. Philadelphia 39, Pa., SH 8-2000

IRON AGE

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Special This Week

Materials Pace Space-Age Progress

This week's special report is the first in a series on Metalworking's Technological Explosion. Materials used to be several steps ahead of designers. Today, the reverse holds true. But science isn't standing still. Our cover photo shows how zone refining improves General Electric Co.'s semiconductors. p. 115

Industry Faces Engineer Shortage

Since 1957, enrollments in U. S. engineering colleges have shown year-to-year declines. At the same time, the demand for engineers has risen steadily. The experts see a real problem in the making for industry. p. 85

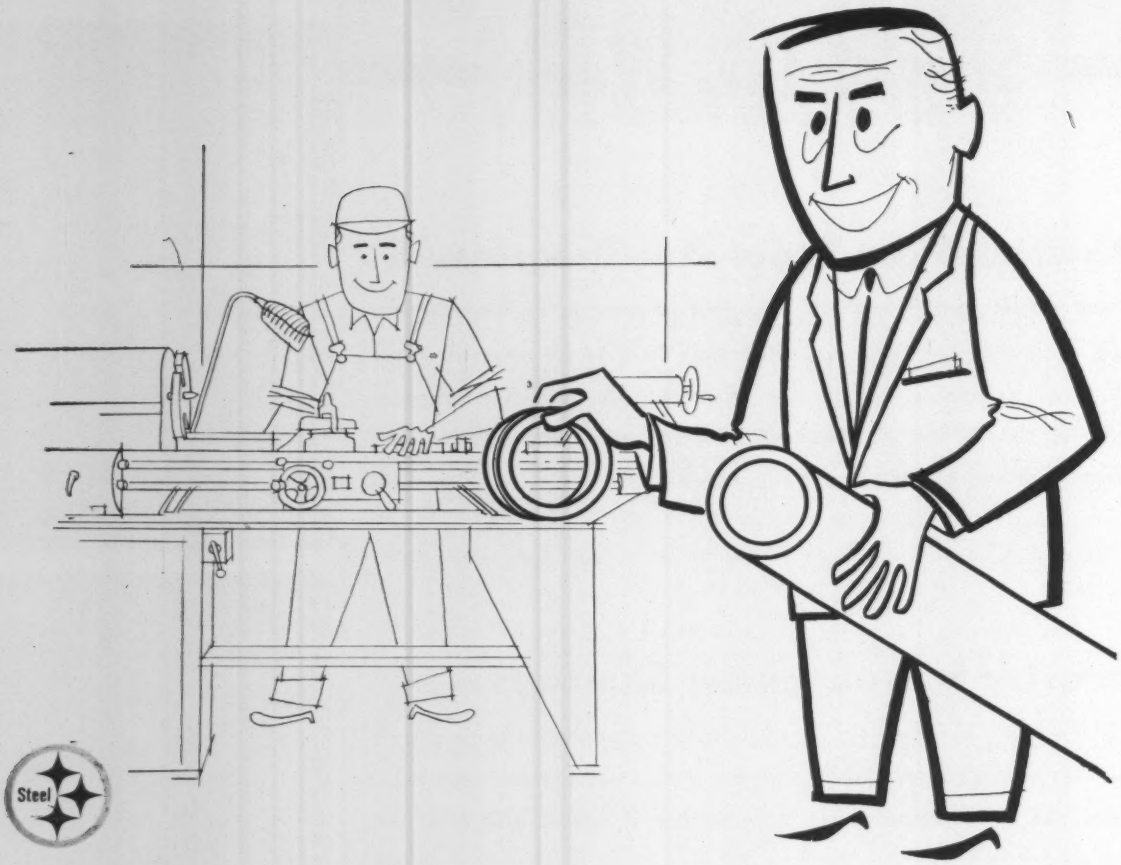
GE Rejects Limit on Low Pricing

The swirling battle over prices and pricing involves Sen. Kefauver and GE's President Ralph Cordiner (right). Latest round in the fight ended with GE refusing to sign the government's decree that it refrain from unreasonably low prices. p. 90

Next Week

Capital Goods Gain Momentum

The capital goods market is heading for higher ground. Stepped up first quarter spending plans of steel companies, automakers and machinery builders point to higher orders. Details for 38 metalworking industries appear next week.



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Rule By Fear: We Are Facing It!

Dictator makers will tell you that fear is their most potent weapon. They use it in all sorts of ways. So do corrupt governments.

Fear is often used to keep offenders in line or to cut down the number of would-be offenders. In those cases, it is at best a borderline practice.

But we are coming close to improper use of fear in our nation. It is bad. It is immoral. It bodes no good for our future.

The latest use of threats and fears is the attempt by the Justice Department to have General Electric Co. sign a paper saying that it would refrain from charging unreasonably low prices that might create a monopoly. Part of the death warrant it was asked to sign was an agreement that GE would have to prove the prices were not unreasonably low.

Such a threat is foreign to our way of doing things. The news on this was printed in The New York Times. We assume the talks were "private" but the Times made it clear what was cooking. Star chamber attempts to carry on something not envisioned by the writers of the Constitution were never as blunt as this.

GE is being told by one arm of our government that its prices are too high and by another appendage that its prices may be too low. How ridiculous—or immorally legalistic—can our government get? Are we to leave decisions to those who make the threats behind closed doors?

If that isn't enough, we have the use of fear against the steel industry. Government—and a Senate committee—have warned steel companies that they will be in trouble if steel prices are raised. If that isn't an attempt to rule by fear, then you can't read these lines.

All the propaganda attempts to pass the crazy tax quilt dreamed up by the Treasury Dept. had their share of high-level, fear-type gobbledegook. Of course, this can be denied. But denials are coming a dime-a-dozen from all sources these days—when the perpetrator is caught in the improper use of patriotism and duty in an effort to put something over. At times the formula seems to be "scare the hell out of the dopes and we will get what we want into law."

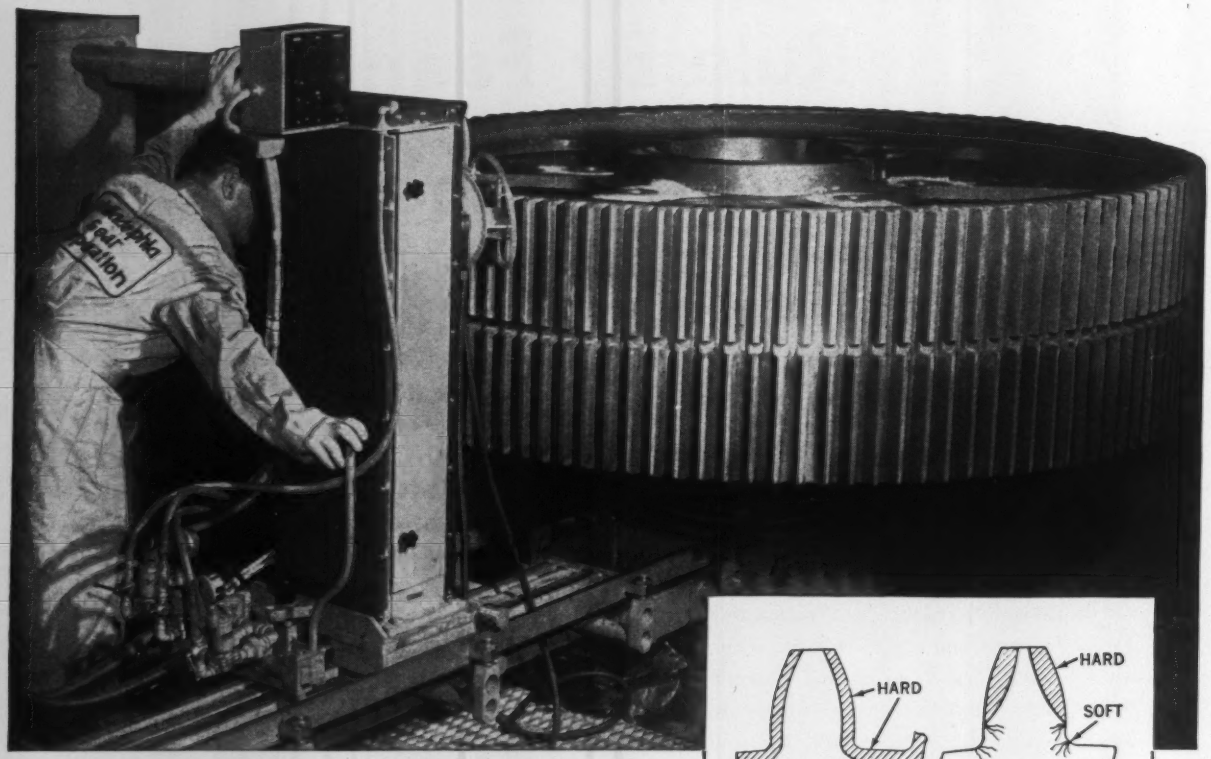
We even have leaks and planned fears of wage and price controls. Denied? Sure, but the plans are fairly well along. It sounds like 1940 and 1941 all over again—complete with the professors, the legal bluenoses, and those who want power over their neighbors—for power's sake.

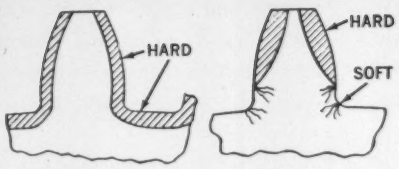
Lord deliver us from that, again!

Tom Campbell

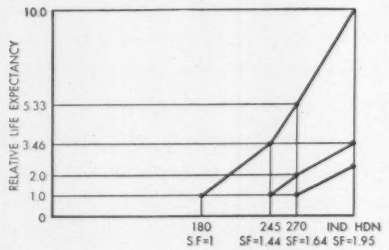
Editor-in-Chief

New Philadelphia induction hardening increases life of large gear drives . . .





New Philadelphia full contour induction hardening (left) provides a continuous hardened area from one tooth flank around the root and up the other flank without interruption. There are no points of stress. Typical heat treated gear (right) shows inadequate hardening of root of tooth, a point of major stress.



This chart shows the relationship between load and gear life. Note that the improved service factor of a gear set may be used to substantially increase gear life, rather than to increase the load.

HERE'S WHY: Full tooth contour induction hardening of large gears provides a uniformly hardened surface from one tooth flank around the root and up the other flank without interruption. Eliminates points of thermal stress concentration. And there is no distortion, a problem of heat treated gearing that requires subsequent grinding.

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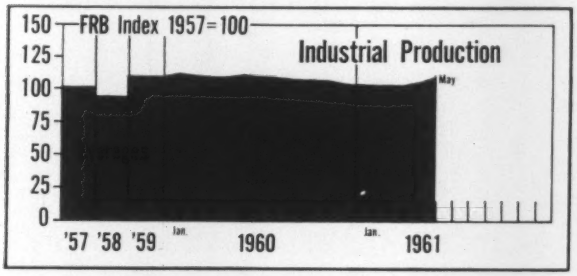
Industrial Production Rises

Industrial production is cranking up steadily towards a new high. Production, seasonally adjusted, rose to 108 pct of 1957 levels in the Federal Reserve Board



index. The April index reading was 105 pct.

Production in May, on the FRB index, was only 3 percentage points below the all-time high made in January of last year.

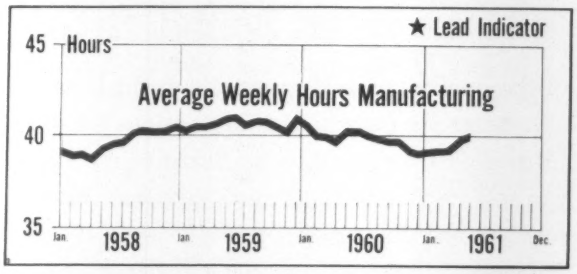
Again, in May, durable goods manufacturing sparked the production advance. Durable goods rose to 103 pct on the index compared to 99 pct for April. Steel and auto production gains led the parade.

June production should hit higher levels. New orders are exceeding shipments in most industries, capacity is ample, and, importantly, present production gains are being scored without benefit of inventory rebuilding. Orders based on stock buildups are in the offing. They give reserve strength to the recovery.

Factory Workweek Rises Again

The average number of hours that factory workers put on their jobs is a good lead indicator of industry's ability to take on more workers.

In May, the factory workweek rose to 39.8 hours, up from 39.6 hours in April. This is the fourth con-



secutive month the workweek has increased. And it is a good indication that industry will be taking on more workers in the weeks and months ahead.

Also, more than 150,000 workers were added to durable goods manufacturing forces in May. Most of these workers went into steel and auto plants.

But unemployment still remains the number one drag on the economy. In mid-May, 4.8 million were jobless.

First Quarter: A Sad Tale

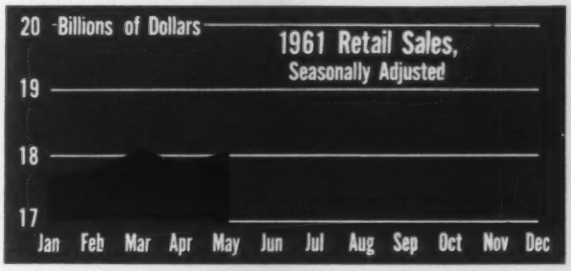
Out of the business shambles of the first quarter now comes the true picture on sales and profits. Securities and Exchange Commission data shows that sales of U. S. manufacturers were down 4 pct from the same quarter of 1960. Durable goods makers sales were down 10 pct.

Profits after taxes averaged 3.5 pct per dollar of sales for the quarter. This compares with 4.7 pct for the March quarter of 1960.

Auto Buying Spurs Retail Sales

Retail sales in May rose to $18.1 billion, up from $17.9 billion in April.

For retailers, there is a double dose of good news



in this sales increase. First, they like the month-to-month rise. But also, April sales had been down from March. This drop had made some think the recession wasn't really over.

There is room to go higher. May sales were still 2 pct under sales made in the same month last year.

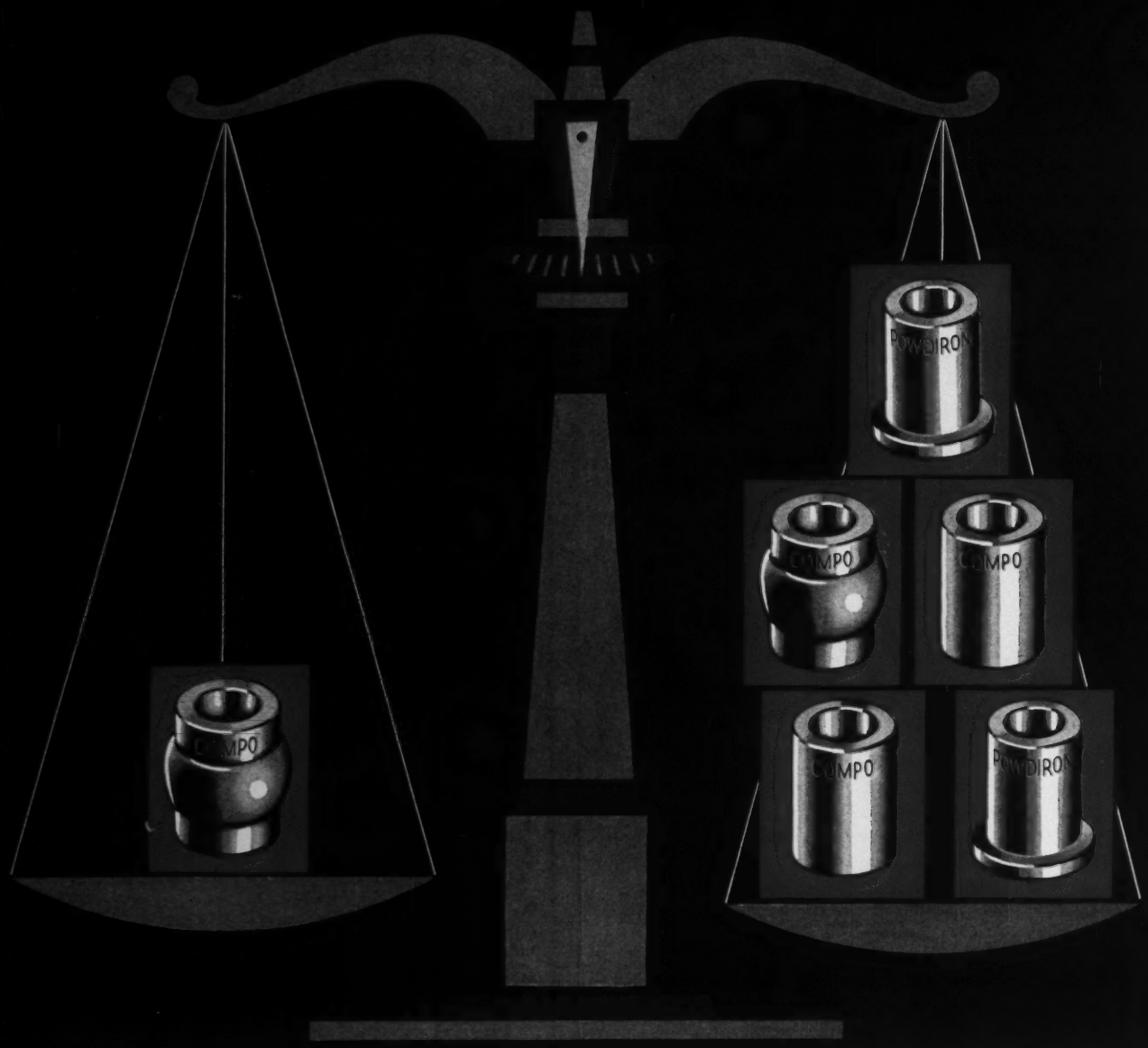
Durable goods sales rose to $5.6 billion in May, up 3 pct from April. The big booster here was in sales increases in new and used autos and automotive parts.

Will Price Cuts Hurt Steel?

Some metal industry oldtimers think current price shading in steel will put a crimp in the buying plans of many steel customers. Their point is: Why rush into the market if there is a chance to get it cheaper.

So far, there is no clear-cut trend to a slowing of buying, except what is expected because of summer shutdowns.

But the oldtimers could be right. At least any stock rebuilding is out of the question with many buyers.



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AFL-CIO: Leaders Back Training Bill

Top labor leaders are moving swiftly to back President Kennedy's proposal for a national manpower training and relocation program (IA—June 8, '61, p. 9.) But they want it to go even further.

MEANY: All in favor.

AFL-CIO president George Meany supports it but suggests these additions to the bill:

Provision for a general strengthening and revamping of the U. S. Employment Service.

A positive statement that "the selection of trainees and workers being relocated shall at no time be influenced by race, color, creed or national origin."

And establishment of an advisory committee of business, labor and educational leaders to guide the program.

Contracts: Keep Seat Open for Government

The Administration will insist that it is against government intervention in labor disputes and contract negotiations. But actions indicate otherwise.

Labor Secretary Arthur Goldberg made a last-minute effort to avert a strike by maritime unions last week. He has injected the prestige of his office into a tugboat strike in New York. And the Administration intervened in the airline engineers walkout.

A prolonged strike in the auto industry this fall would bring pressure from the White House for a settlement. The Administration can't afford to let anything stall the nation's recovery. Similar reasoning will apply to the steel industry.

Kennedy Asks Changes In Jobless Pay

President Kennedy has asked Congress for changes in the Federal-state unemployment compensation system.

He asks for a permanent program of supplemental unemployment compensation, and for equalization grants for states hardest hit by unemployment cycles. He also wants to extend coverage to 3 million more persons.

Another change would establish a supplementary program which could be invoked during recessions. It would waive certain eligibility requirements for persons who have exhausted their benefits.

AFL-CIO: Union Jobs For African Students

Visiting African students can get low-cost instruction in how to run unions this summer. AFL-CIO says it's willing to pay half the cost of "employing" the students in union offices.

Presumably, the government would be expected to subsidize the other half of the cost.

USWA: Prices and Wages

Steel prices will play an even larger-than-usual role in steel labor contract talks next year when the steelmakers and the United Steel Workers of America call off their 1959 truce.

But even before then, this October, in fact, steel wages will go up. This is under the present contract.

It is axiomatic that the cost of making steel in October will be higher than September. This furnishes an argument for higher steel prices. And until a few years ago, the argument worked.

But the steel industry is shuddering under a wave of direct and indirect price cuts on an increasing number of products. Automakers are pressing for, and getting, price concessions. Other steel products are under pressure from imports. Domestic competition is marked by rough infighting. And there's just no demand from some other markets. These factors account for price cutting now.

The longer the price cuts remain in effect, the harder it will be for USWA president David J. McDonald to wring much — if anything — from the steel companies next year.

But a hike in steel prices would strengthen the union's position. And the USWA would then likely go all-out for a repeat of the present contract, plus substantial improvements.

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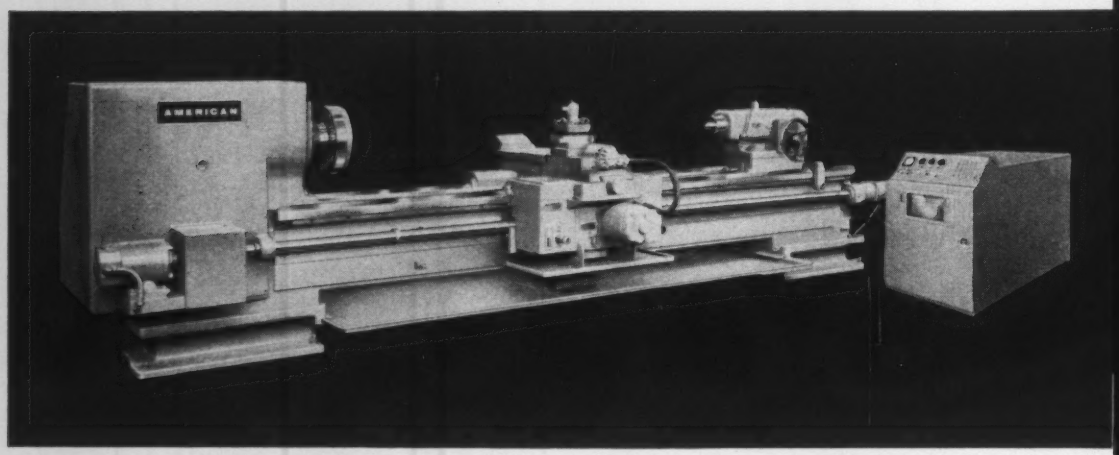

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★Steel Prices Set in Capital?

There's no longer any hesitating about it: The Kennedy Administration has decided to go all-out in opposing higher steel prices.

This is a much more forceful position on steel prices than that taken earlier. Up until last week, the White House took the scholarly position that it would examine the need for higher steel prices and would come up with an opinion based on the economic facts of life.

This has all been changed.

The President's advisers have taken off the gloves and are making it clear that the White House is going to oppose higher prices—if and when they are published—with every weapon at its command.

The theme of the political oratory attacking higher prices will be this: If most steel companies can make a fair profit operating at only 60 pct of capacity, they can make fatter profits as the operating rate rises. Hence a price advance, so the argument runs, is unnecessary.

Sen. Kefauver, too, is determined not to be left out of the act. He is preparing plans to reopen his attack on the steel industry at the first sign of a price rise. He has already announced that he'll call for public hearings when higher prices are posted. In his view, any price rise—no matter how small—will be viewed as unwarranted.

Thus, the inevitable upward movement in prices is going to be the signal for an assault on the steel industry by both the legislative and the executive branches of government. For steel, the going will be rough. (For more on steel prices, see p. 88 and Steel Product Markets, p.174.)

■ Depreciation Reform May Face Long Delay

After lengthy public hearings, the taxwriting House Ways and Means committee has retreated behind closed doors to rewrite the tax laws. It will be a long, slow process.

It's doubtful if any of the needed reforms—such as realistic depreciation—can be written into law this year. There are only two months remaining in this year's session.

Although House hearings are now concluded, the road ahead is a long one: Ways and Means Committee recommendations to the House; House debate and final vote; Senate hearings; Senate debate and final vote; President Kennedy's approval or disapproval.

Mr. Kennedy's proposals for tax reform were roundly criticized as inadequate by business and industry during the hearings. Organized labor was the only group to support Mr. Kennedy.

■ Corporate Tax Unchanged

Congress insists on keeping the 52 pct tax rate on corporate income in effect for another year—through June 30, 1962.

In addition, wartime taxes on new cars, cigarettes, liquor, beer, travel, and telephones have been extended for the same period.

The 52 pct "emergency" tax rate on corporate income goes back nearly 20 years. Enacted early in World War II, it has been extended year by year, along with numerous war-time excises.

The Kennedy Administration needs every dollar it can get. Spending is already far outrunning revenues. Since the White House insists it cannot trim any existing government programs, it seems clear that some new and higher taxes will eventually have to be written into law.

■ Massive Public Works Program Abandoned

The Kennedy Administration has decided against any massive public works spending this year to boost the economy and cut unemployment. The union-backed proposals for up to $1 billion in Federal grants for local public works projects were short-circuited by the growing Federal budget deficit.

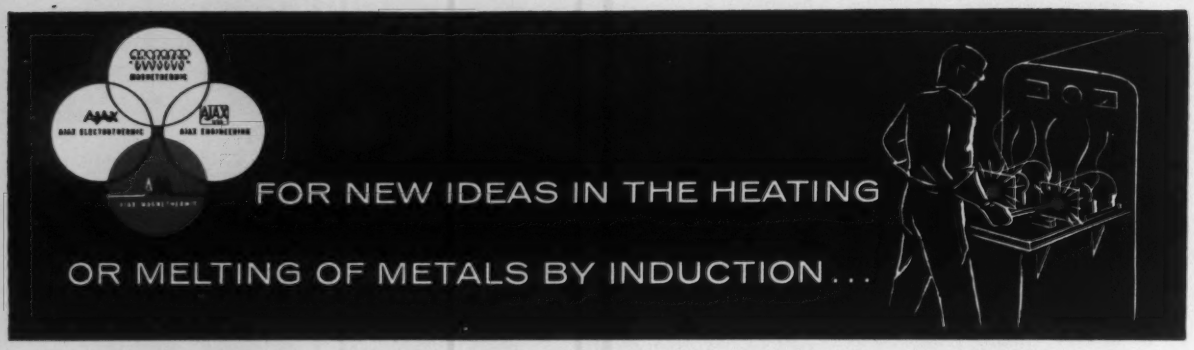
Labor Secretary Goldberg reluctantly put the Administration in opposition to a measure pending in Congress to dole out an immediate $500 million to states and localities for public works spending, and another $500 million later if needed. The measure is sponsored by Sen. Joseph Clark, (D., Pa.), who says it would provide 770,000 jobs.

■ Gas Industry Fights Tight Federal Control

The natural gas industry is renewing its fight for freedom from iron-bound Federal regulation—a fight which will bring important expansion in the industry if it is successful.

Industry wants Congress to lift court-imposed utility type control of the industry and instead declare natural gas a commodity. Federal Power Commission would still control gas prices, but on a supply and demand basis, rather than cost of delivery.

In addition to giving the gas industry commodity controls, it would regulate sales by pipelines to industry in off-peak seasons.



Equipment for heating steel bars for forging, one of many products of AM for the heating or melting of metals by Induction.

WATCH AM

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"induction heating is our only business"

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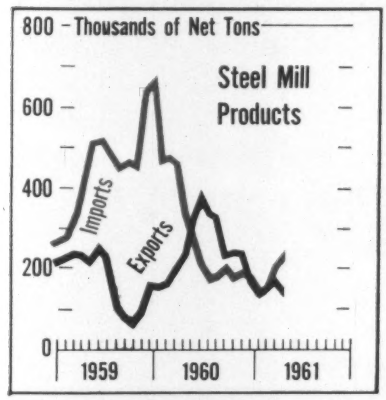
Automatic Heating by Induction for forging an automotive part.

Steel Exports Drop As Imports Climb

Imports of steel mill products continued to rise in April. Exports dropped another notch.

According to the Dept. of Com-



merce, imports totaled 235,000 tons in April. That's 24,000 tons more than March imports. But it's 92,000 tons less than April, 1960. The total of steel mill products imports for the first four months of this year was at an annual rate of 2.2 million tons. This is well below the 1960 level of 3.5 million tons.

April's exports totaled 138,000 tons—a drop of 30,000 tons from March. It's also 97,000 tons less than April, 1960. Total exports for the first four months of 1961 reached 585,000 tons. This is compared with the 743,000 tons exported during the same period of 1960.

However, the value of U. S. steel mill exports so far this year still runs ahead of imports. In fact, the value of exports exceeded import value by $35 million.

Alcoa Announces New Australian Venture

Aluminum Co. of America has announced plans for a new aluminum venture in Australia.

Alcoa of Australia Proprietary, Ltd., will establish and operate a $100 million integrated complex. The new company will be controlled by Alcoa, but 49 pct of it will be owned by Australian mining companies.

When the project is finished it will include Bauxite mining, a refining plant, sea transport facilities, an aluminum smelter, power production, and facilities for fabricating.

British Steelmakers Get Price Rise

British steel prices went up this week. The move was expected (IA —June 15, p. 13), but the gain fell short of what United Kingdom steelmakers had sought.

The price increase is the equivalent of .0625 cents per lb. British steelmakers wanted gains of at least twice this amount to offset higher fuel and transport expenses.

According to the British Iron and Steel Federation, the price increase should mean an additional $21 million in steel companies' earnings. But it estimates that U.K. steelmaking costs will rise about $70 million.

Argentina Production Planned for Rambler

Rambler cars will be made and assembled in Argentina next year. It will be a joint venture among American Motors Corp., Willys Motors Inc., and Industries Kaiser Argentina, S. A.

The agreement is subject to approval by the Argentine government.

Production of the Rambler Classic models will begin early next year. Other models in the Rambler line will follow. The proposal provides for licensing I.K.A. to produce Ramblers at its Cordoba plant.

Mexican Credit

The Export-Import Bank of Washington has authorized a $6.5 million credit for Aluminio, S. A., of Mexico. The credit will be used to purchase U. S. aluminum smelter machinery and materials. The equipment will be installed in a new plant in Veracruz.

Exports Still Vital For Scrap Market

The importance of exports to the scrap industry was vividly illustrated during the recent convention of the National Assn. of Purchasing Agents in Chicago.

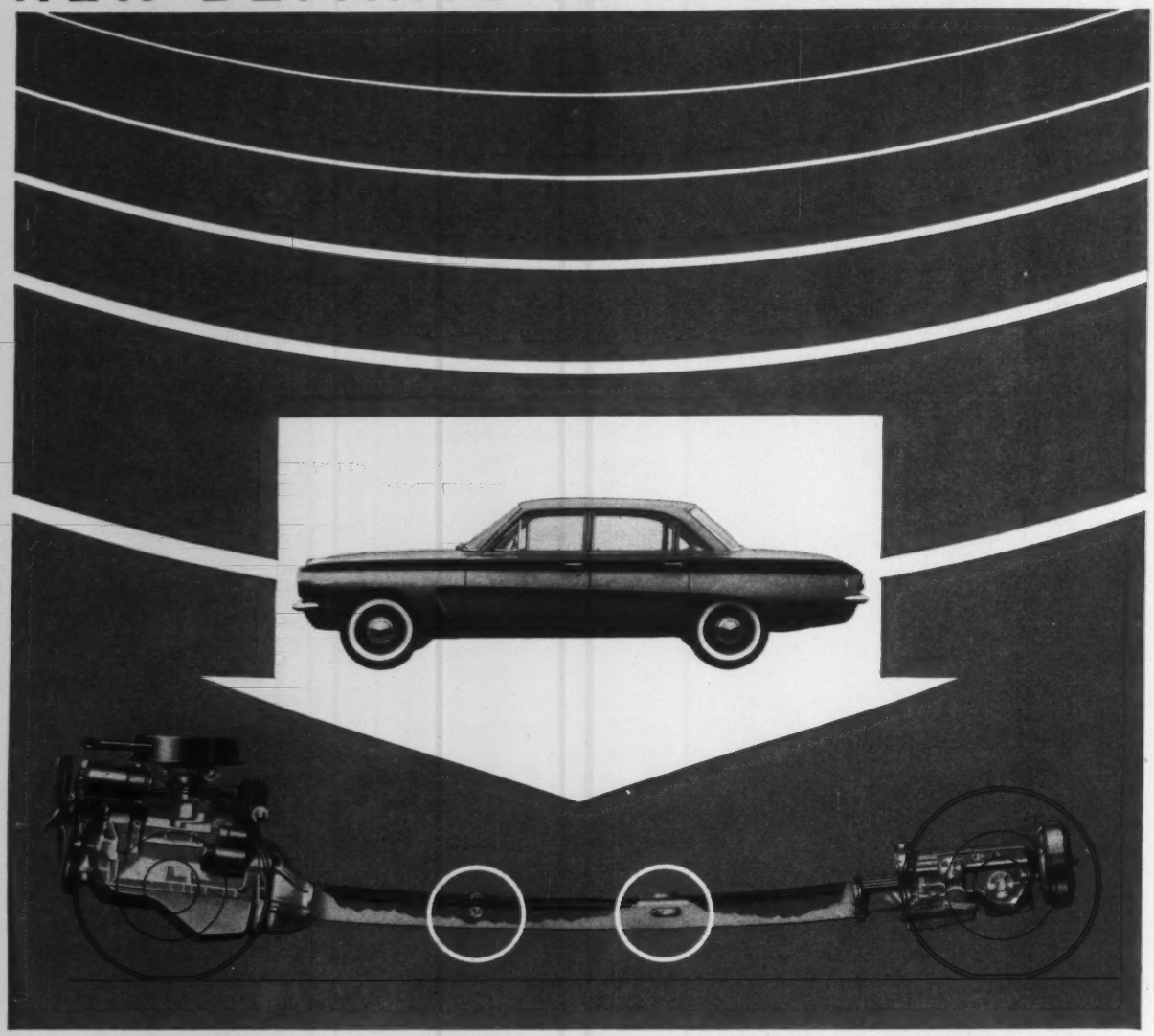
During a panel discussion, F. G. Buchheit, assistant director of pur-

chases, U. S. Steel Corp., said scrap exports should continue at about the same level as in recent years.

The biggest overseas consumer of U. S. iron and steel scrap in recent years has been Japan. Its annual average is better than two million tons (see chart).

Another interesting point, made by Walter Roth, president, Luria Steel & Trading Corp.: In recent months, many No. 1 factory bundles from the Midwest have been moving overseas.

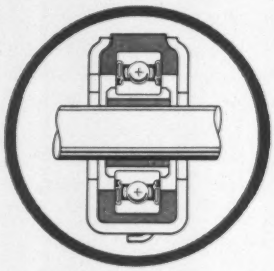
NEW DEPARTURE CASE HISTORY



NEW DEPARTURE BALL BEARINGS ARE USED IN TEMPEST'S REVOLUTIONARY NEW DRIVESHAFT!

N/D Sales Engineers cooperated with Pontiac engineers in the development of specially designed ball bearing assemblies to support the 2-inch "bend" in the Tempest driveshaft. These unique assemblies are rubber insulated to dampen driveshaft vibrations . . . and feature N/D sealed and lubricated-for-life Sentri-Seal ball bearings. Press-fitted with the bearings are plastic lined steel shells for snug support of this propeller shaft assembly—proved in over three million miles of rugged testing.

New Departure continues to help lead the way in advanced engineering for more reliable products in every line of industry and defense. For consultation or early design discussions on your ball bearing application, contact the N/D Sales Engineer nearest you, or call or write to New Departure, Division of General Motors Corporation, Bristol, Connecticut.



Two N/D ball bearing assemblies like this are mounted within "bent" torque tube.

NEW DEPARTURE

BALL BEARINGS · PROVED RELIABILITY YOU CAN BUILD AROUND

Resists White-Hot Gas

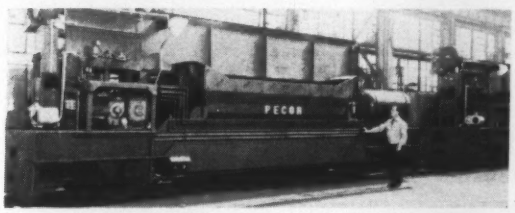
Magnesia and/or zirconium oxide will be key materials in building electric-power generators for the future. Both of these ceramics withstand the white-hot gas streams from which magneto-hydrodynamic generators derive their power. In these MHD generators, ionized-gas streams move at speeds up to 2000 mph. At 5000°F, the gas takes the form of a plasma. This plasma melts, oxidizes, cracks or erodes conventional materials.

More Uses for Beryllium

Greater use might be found for beryllium if methods for forming complex shapes could be devised. One fabrication problem has been the metal's toxicity. Work at the University of Cincinnati's Kettering Lab shows that extruded U-sections up to 15 ft long can be formed. Other complex shapes will follow shortly. Nontoxic-machining tests are also underway. All of these tests are sponsored by the Air Materiel Command's Mfg. Technology Group.

Ore Moves Under Furnace

With integral scales, a pair of self-propelled railroad cars are slated for use in blast-furnace tunnels at United States Steel Corp.'s Lorain Works. They'll weigh and transport iron ore, sinter fines and limestone charges from storage to skip hoists. Each of these special rail cars has a 320 cu ft capacity. Both feature payload readout systems and centralized lubrication.



BUILT-IN SCALES: Yield printed records.

Package for Protection

High-density polyethylene serves as the base in a new protective-packaging method. Two foamed-plastic caps snap on the ends of electronic instruments while they're being packed. Inside a shipping box, the caps hold the instrument in suspension by pressure at both ends and on all four sides. This concept lends itself to mechanized packaging on high-volume items.

Automates Circuit Wiring

Ten times faster than a man, a new unit turns out wired-circuit modules for Polaris fire-control systems. It automatically feeds, positions, cuts to length, strips and wraps both ends of every wire to two terminal pins in about seven seconds. Punched cards serve as the control media. Along with production-time and material-cost savings, the new unit precludes thermal damage to heat-sensitive materials. It also provides greater wiring density when a large number of connections must be made in a limited amount of space.

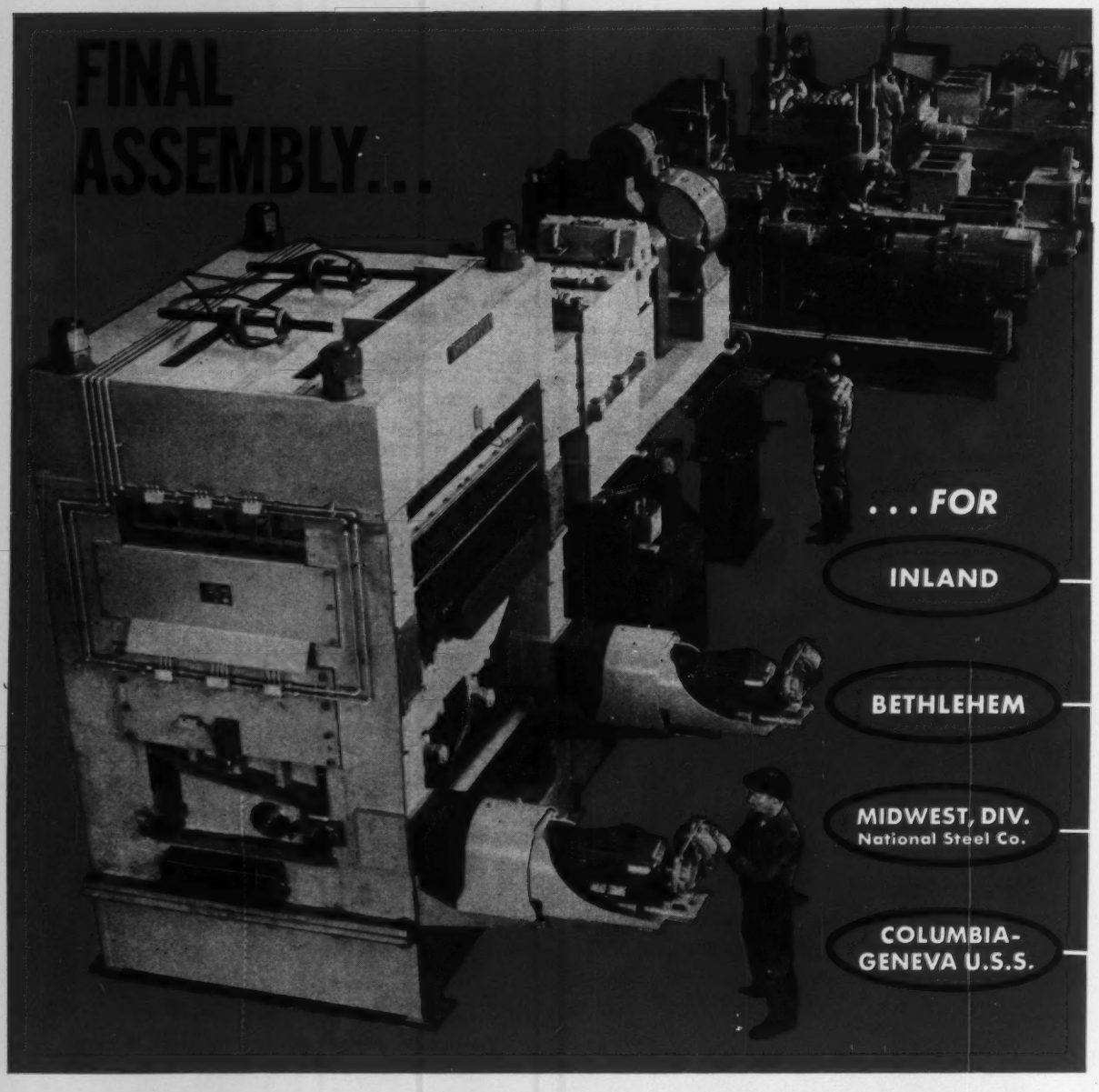
CRIMPED WIRES: Insure shock-proof circuit.

Programmed Inspection

Tape-controlled setups open the door to ultra-precision in gaging complex shapes. Automated measurements in millionths reduce production and tooling time on hard-to-check parts. This breakthrough in metrology allows simultaneous and completely-reliable gaging of inside and outside contours to heretofore impossible tolerances.

Vectors Pinpoint Flaws

Overall magnetization and a fluorescent wet-inspection medium detect tiny flaws in steel castings weighing up to 25 tons. This nondestructive testing method speeds the evaluation of minute flaws before any casting leaves the foundry. Small internal fillets and tiny cored openings can cause serious damage if they're not discovered. Three-way magnetization in three planes defines the extent of every casting's defects.



These 4 Voss Inverted Roller Levelers are in final assembly. Soon they'll be at work in varied applications ranging from galvanized and hot and cold rolled to plate and high yield missile stock. Each of these companies, already a user of Voss Levelers, know they obtain precise area control and equal to or better than stretcher leveler flatness at high production speeds. Let Voss put 30 years of leveling and flattening experience to work for you.

Call or write today! We'll be glad to arrange a demonstration without obligation.

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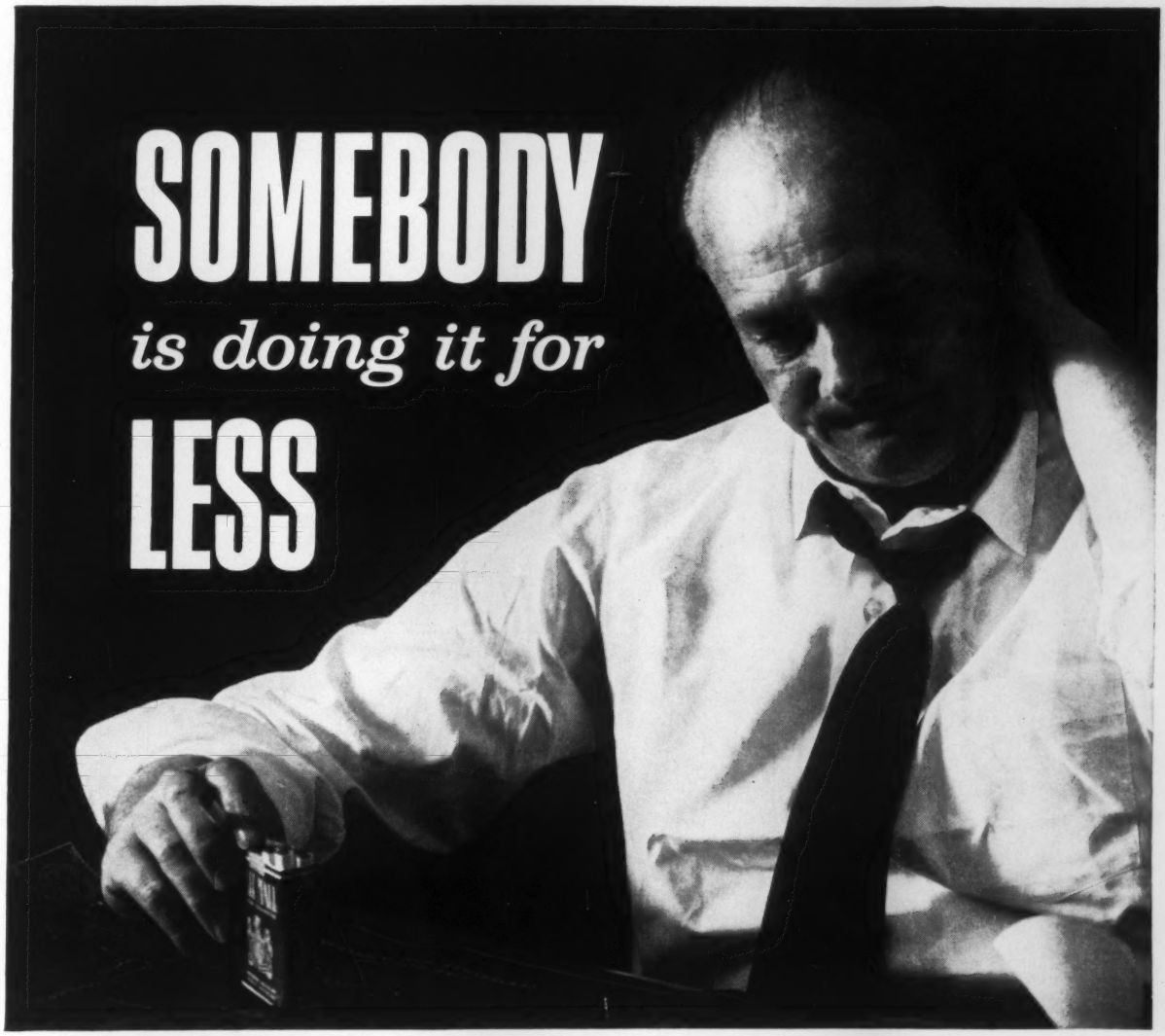
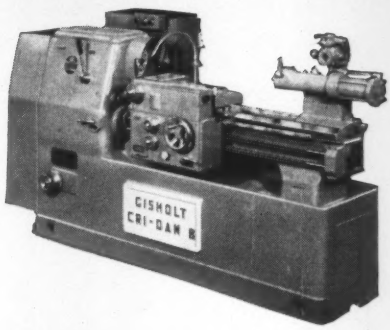
SOMEBODY *is doing it for* LESS





Gisholt CRI-DAN Model B Automatic Threading Lathe—Sets up in 8-15 minutes. Inexpensive single-point carbide tools produce all types of internal and external threads: single- or multiple-start, coarse or fine, left- or right-hand, straight or tapered, standard or special form—in any material, including new high-tensile, hard alloys.

Call your Gisholt Representative or write for Catalog 1215.

Can you afford to stay with conventional threading methods and pass up savings from 30% to 80%?

These savings can be yours with a Gisholt CRI-DAN High Speed Threading Lathe. Times are drastically reduced. You use single-point carbide tools. *Quality* threads—simple or complex—are produced automatically.

Whether you're threading in lots of 6 or 600, the CRI-DAN method will enable you to do it for less.

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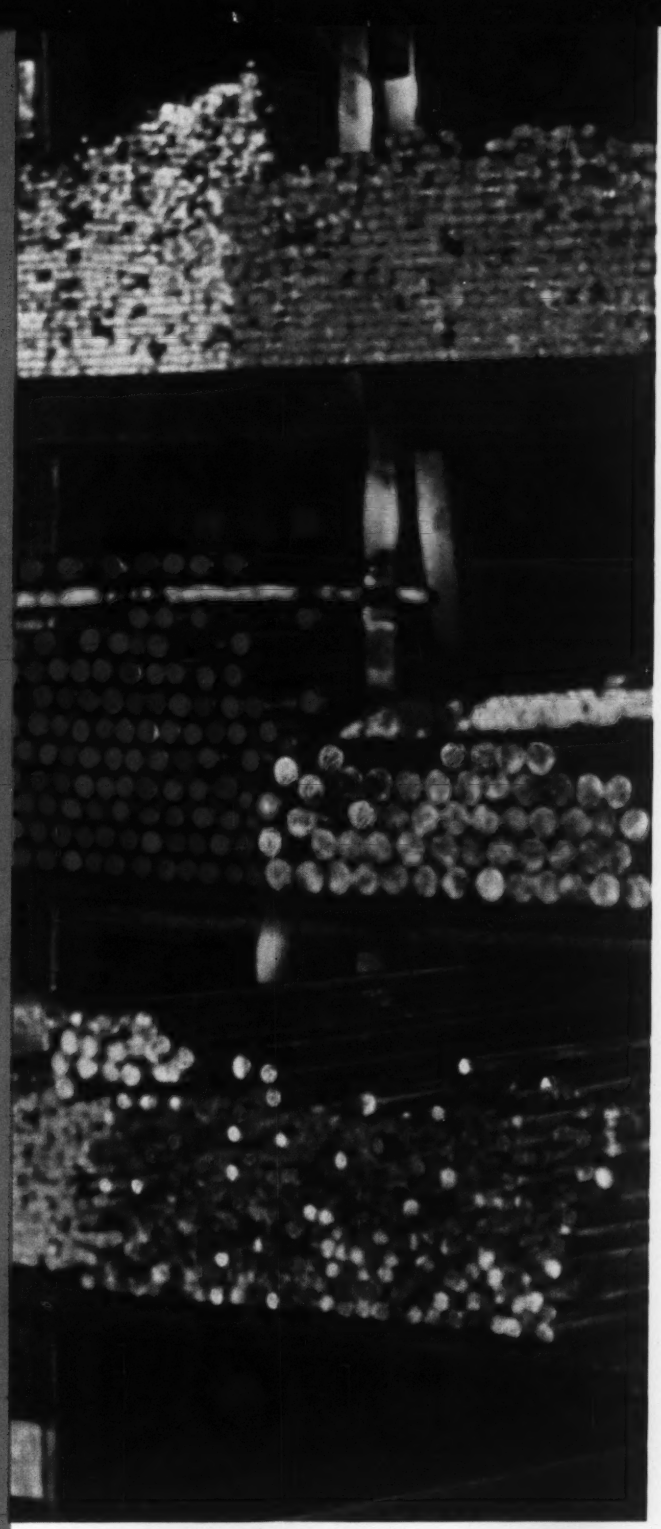

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Depend on Youngstown for quality steel. And get fast, sure delivery of Youngstown steel from your Steel Service Center. Steel in a day. Steel in hours. Steel in the variety and amount you need. Youngstown steel in plate, bar and sheet. Leaded steels, alloy steels, Yoloy steels, tin plate—hot rolled, cold rolled and galvanized sheet. All quality steels from Youngstown, a major supplier to America's *independent* Steel Service Centers.

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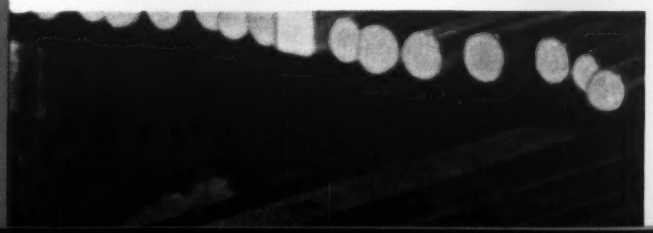
Steel to help you make better products. Stocks to reduce your inventory. Service to help you cut costs. Count on it. Steel from Youngstown. Service from your *independent* Steel Service Center.

Youngstown – growing force in steel



For information about all Youngstown Steel Products, write: Dept. 25-H,
The Youngstown Sheet and Tube Company, Youngstown, Ohio

Steel

6 WAYS TO SAVE MONEY IN YOUR DEGREASING OPERATION

...from the makers of COLUMBIA-SOUTHERN TRICHLOR

1. Keep your solvent in the machine

Your solvent can't clean much metal when it's floating around in the air. Prevent drafts which remove solvent. Check open doors, windows and location of fans. Keep cover on unit during idle periods—solvent evaporates whether it's hot or cold.

2. Don't waste heat

By keeping your heating and condensing coils clean, you can operate your equipment at the design rate and thus control resultant waste of solvent and heat. Make sure the thermostats are kept clean and functioning properly.

3. Make sure your solvent is formulated for the job

Columbia-Southern Trichlor contains a special neutral stabilizer which enables it to stand up under continuous operation with high contamination rates. Trichlor's stabilizing system is designed specifically to permit you to handle aluminum as well as other metals safely in the degreaser.

4. Establish good cleanout procedures

Keep an eye on sump temperatures, and distill in time to avoid excessive contamination and low heat transfer. You not only get more efficient operation, but you may also save your equipment and reduce operating costs.

5. Protect equipment investment with scheduled maintenance

Schedule routine maintenance on valves, pumps, piping, gaskets and water separator; regular attention to little items prevents emergency repairs to the whole system.

6. Keep down dragout losses

Handle and rack your work properly. We often find that the type, shape and weight of parts going through machines are not given proper consideration. Liquid solvent may be trapped or vapor levels dropped as a result. A review of these factors, plus location of sprays, and throughput speed can reduce waste by a healthy figure.

These simple but effective rules have been developed by the Technical Service group at PPG's Chemical Division, as a result of hundreds of service calls and years of experience in applying Columbia-Southern TRICHLOR to degreasing operations.

Trichlor is built for the job, starting with a "triple-check" quality control system during manufacture. The stability, uniformity and purity of Trichlor are guarded by the blending in of carefully compounded *neutral* stabilizing agents which maintain the solvent in a safe, effective state through the toughest service.

Save money in your vapor degreasing operation by following the six rules above and specifying Columbia-Southern Trichlor. Call your nearby Trichlor distributor or the Columbia-Southern office serving your area.

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Rented Salesmen

Sir—The June 1 issue of The IRON AGE reached my desk and, as usual, was of much interest. I was particularly intrigued by the second item on p. 33 entitled "Salesman for Rent." As we cannot locate an office of Salespower, Inc., locally, would it be possible to receive information regarding its executive office headquarters?—Fred A. Fowler, president, Fowler Manufacturing Co., Portland, Ore.

■ **Contact Salespower, Inc., Div. of Manpower, Inc., 187 N. LaSalle St., Chicago.—Ed.**

Small Businesses

Sir—Your recent article on small businesses ("Small Business Makes Big Gains; Forges Even Brighter Future," IA—June 8, p. 59) was most interesting. This article should be followed up by an analysis of why some typical small businesses failed.

I have had occasion to observe and deal with small businesses. You will be interested to know that the main reason for the failures and stagnations I have seen is the same as your No. 1 success key: Too many small business owners run their own shows—too completely.

As your article pointed out, most small business owners have previous experience in sales (or at least in only one aspect of their business). The void could easily be filled if the boss were willing to hire competent talent and give the men some freedom to do their job.

I was in a plant recently when the boss advised an inquirer that he was too busy to go out to discuss some new business for at least a week. This, after having just told me that unless new business was obtained it would be necessary to lay off some men. The explanation offered for this incongruity was that he could not leave the plant because he had to check up on his engineering and manufacturing groups to be sure that they were doing the job right.

In another shop, I found five tool makers standing idle, on full pay. Inquiry revealed that the boss had been called out suddenly to help a customer with some new equipment that he had bought and had not had time to assign these men work. Yet there was work to be done.

I have found that the owner of an expanding small business finds it difficult to accept the fact that, as the business grows, he loses more and more personal contact with each detailed operation. A recognition of this fact from the start removes the growth deterrent.—Simon A. Greenberg, Flushing, N. Y.

Clear Thinking

Sir—Your recent editorials entitled "Fighting Communism: Why Is It So Difficult?" and "Freedom is Dying: The Reds Are Killing It," were excellent examples of clear-headed thinking—the type that America needs.

I used both editorials in the Naval Reserve Leadership program to which I have been attached. Let us see more of this in your forthcoming issues.—R. H. King, Superior Carbon Products, Inc., Cleveland.

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Regardless of the size, head style, material or finish of the standard fasteners needed for profitable assembly in your plant, Southern carries them in stock. This means that your order, large or small, can be on its way to you within hours after it is received, if you request rush service.

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Forty-five two-stand tandem temper pass cold mills—90 stands total—are rolling superior tin plate on MORGOIL bearings the world over. Regardless of ultimate requirements for capacity, speed and stiffness MORGOILS are always your best choice.

The reason: MORGOIL bearings are products of many years' experience in the rolling mill field featuring sound design, precision manufacture by skilled craftsmen and continuing research—all backed by an alert field service organization.

Write for technical counsel on any application.

M-2

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Materials for the Future

This week The IRON AGE begins bringing you a new series of four-color technical articles.

The title? Metalworking's Technological Explosion. The reason? Obvious. There has been a technological explosion in the industry since World War II. It's still going on and is bound to increase in impact in the immediate years ahead.

Quickening Pace — Before and during the war, metalworking's technical advancement was slower because of war-time limitations and business economics. Engineering and production people were charged with getting the most out of what they had to work with—not with finding out what more could be gained by trying something new.

Now, changes are taking place so fast it's almost impossible to keep up with them. In individual technical articles we have continually brought you reports on specific advances. But the objective of this series is to uncover and report the latest thinking on the different aspects of the broad technological frontiers of metalworking.

Our job, as we see it, is to let you know what's going on in those areas you may not be working in today but very well may be tomorrow.

Lead Article—The first article in our Technological Explosion series covers the subject of materials and appears on p. 115. It was prepared by Metallurgical Editor C. L. Kobrin after interviews with technical experts on the "thinking front" of materials technology in some of the best companies in the country.

To our knowledge there never has been a more authoritative group of experts interviewed on such a topic. Those questioned by Editor Kobrin include the top men in metals technology.

All Experts — As proof, those interviewed include: Dr. W. R. Hibbard, manager, metallurgy and ceramics, General Electric Co. Research Laboratories; J. H. Jackson, manager, metallurgy, Battelle Memorial Institute; Dr. Robert Maddin, director of the School of Metallurgical Engineering, the University of Pennsylvania; and N. E. Promisel, chief materials engineer, Bureau of Naval Weapons.

Dr. Eraldus Scala, manager, materials research, Research and Development Div., Avco Corp.; Dr. Morris Tannenbaum, assistant metallurgical director, Bell Telephone Labs; Dr. Robert Thomson, manager, metallurgy, General Motors Corp. Technical Center; and Dr. V. F. Zackey, assistant manager, Applied Research, Ford Motor Co. Scientific Laboratory.

Editor Kobrin also extends special thanks to Dr. R. W. Crozier, the executive director, and Robert Burns, the executive secretary, of the Materials Advisory Board of the National Academy of Sciences.

The Materials Explosion article points out for metalworking companies the endless variety of materials that will play a part in the metalworking products of the future, whether they be spaceships, automobiles, machine tools or TV sets.

Another Advance

Man's ingenuity knows no bounds. The latest development is an automatic cocktail mixer, designed and marketed by the AutoBar Systems of Sellersville, Pa., a division of American Machine and Metals, Inc.

About the size of a two-unit milkshake mixer, it's known as the Cocktailmatic. According to the manufacturer, it mixes fresh martinis and manhattans on the spot, in uniform proportions and uniform sizes. Each drink is counted on a meter. It can be pre-set to serve dry, very dry or very, very dry martinis.

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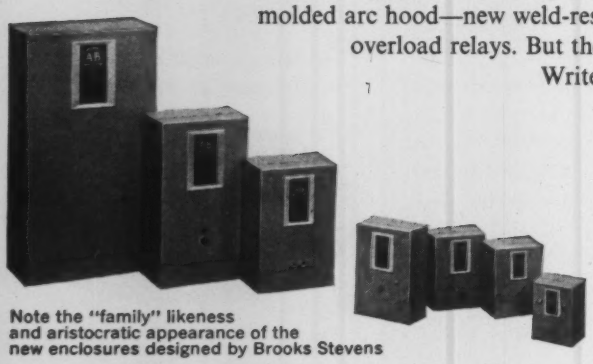
the greatest advance in motor control in 30 years

From their amazing compactness to their almost unbelievable operating life—measured in *millions* of operations—this entire family of Bulletin 709 solenoid starters is *new in every detail.* They feature a new, patented, high-efficiency magnet—new molded coil—new hot molded arc hood—new weld-resistant contacts—and new truly *trip-free* and *tamperproof* overload relays. But these new starters use the old Bulletin 709 heater elements. Write today for all the details on this really amazing new line of Allen-Bradley Bulletin 709 motor starters.



Note the "family" likeness and aristocratic appearance of the new enclosures designed by Brooks Stevens

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COMING EXHIBITS

Western Plant Maintenance & Engineering Show—July 18-20, Pan Pacific Auditorium, Los Angeles. (Clapp & Poliak, Inc., 341 Madison Ave., New York, 17.)

National Chemical Show—Sept. 5-8, International Amphitheatre, Chicago. (Chicago Section, American Chemical Society, 86 E. Randolph St., Chicago 1.)

Industrial Building Exposition—Sept. 25-28, New York Coliseum.

MEETINGS

JUNE

National Tool & Die Manufacturers Assn.—Summer meeting, June 21-25, Schroeder Hotel, Milwaukee. Assn. headquarters, 907 Public Square Bldg., Cleveland.

American Society for Testing Materials—Annual meeting, June 25-30, Chalfonte - Haddon Hall, Atlantic City, N. J. Society headquarters, 1916 Race St., Philadelphia.

Gray Iron Founders' Society, Inc.—First annual meeting, ductile iron producers, Case Institute of Technology, Cleveland, June 26.

American Vacuum Society — 5th Annual conference, June 26-27, Heights Campus, New York University, New York.

JULY

Cast Iron Pipe Research Assn.—Annual meeting, July 26-27, Seaview Country Club, Absecon, N. J. Assn. headquarters, Prudential Plaza, Suite 3400, Chicago.

AUGUST

American Astronautical Society—Fourth western regional meeting, August 1-3, Sheraton-Palace Hotel, San Francisco.

(Continued on P. 28)

"Call FOSTER for Rail"...Get Relayers PLUS

Installing or expanding in-plant trackage? Foster will deliver Quality Relaying Rail at lower cost . . . "plus" all necessary new track accessories, switch material—even the track tools to do the job. To help select the materials best suited to your job, call the Foster Track Specialist.

You will save on freight from Foster's nationwide warehouses, all of which stock all sections of relaying rail "plus" new rail for crane runways and specialized applications.

Another "plus": Foster's Track Inspection Kit, which illustrates all the elements needed for an efficient industrial siding. It's a real help for proper track maintenance.

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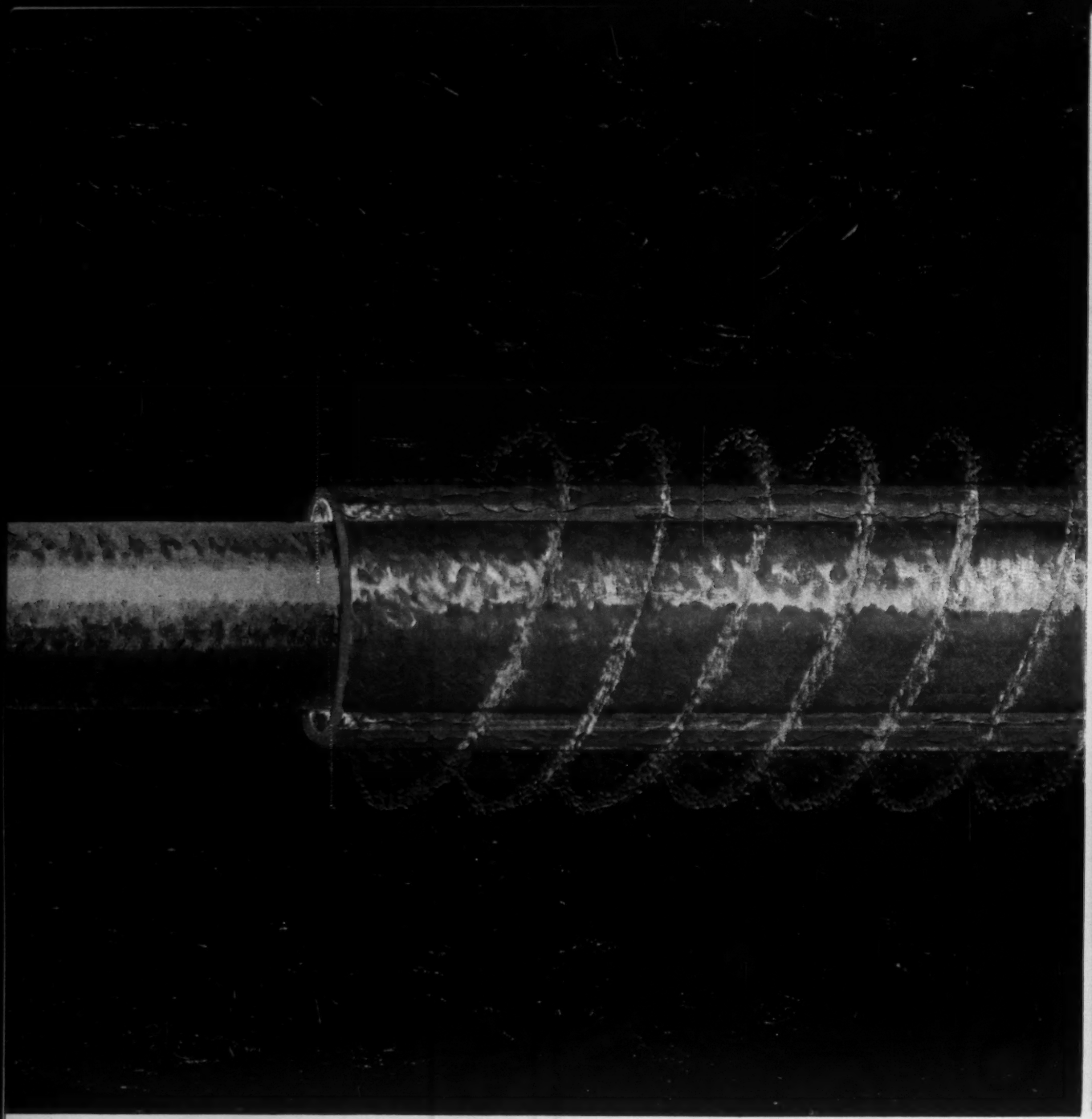
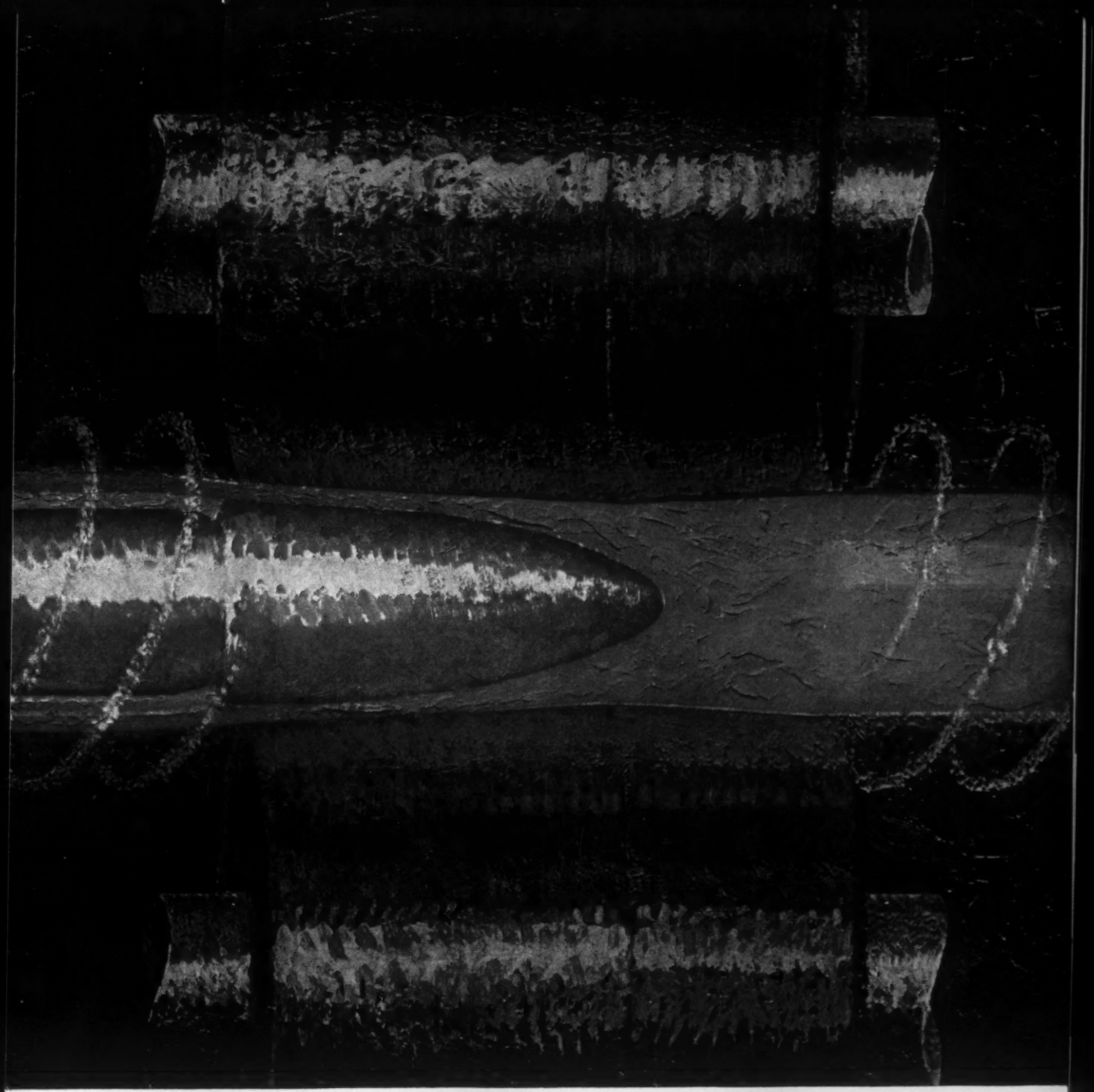


Remember the good old ways

This mark tells you a product is made of modern, dependable Steel.



The piercing operation is one of the first steps in creating seamless pipe or tubing from a solid section of steel. After we set the hot steel billet in place, we ram it. Spin it. Push its insides out. And stretch it into a hollow many times longer than the original piece of steel.

There's nothing new about making seamless tubular products this way—we've been doing it for 70 years. This doesn't mean that we're old-fashioned—but sometimes the old ways are best. Whether we use an old established method or a revolutionary new one, whatever is the best way to make pipe or tubing is how National Tube makes it.

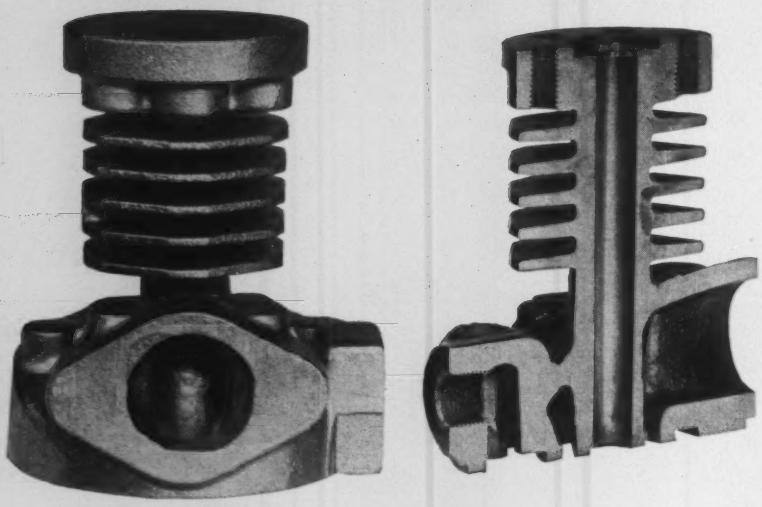
USS is a registered trademark

USS

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors

United States Steel Export Company, New York



HIGH PRESSURE LOW COST

This 8 pound Meehanite Metal casting made for the Joy Manufacturing Co. by Hamilton Foundry is a fourth stage air compressor cylinder. Pressures build up to 6,000 p.s.i. and require a high strength, pressure tight and wear resisting casting. Alloyed Meehanite®, oil quenched and tempered, raised Brinell hardness of the cylinder wall to 275-300, and increased tensile strength to 60,000 p.s.i. Meehanite was chosen for this casting because controlled structure and small uniform flake graphite produce pressure tight castings of uniform density and strength.

Manufacturing costs drop when uniform, high quality castings go through production. In this case, Meehanite castings from Hamilton Foundry give Joy tight control on finished parts costs by combining dimensional accuracy, uniform machinability, a low rejection rate, and delivery on schedule. Pressure tightness, long service life and fine surface finish insure Joy's reputation for product quality.

When new and unusual design problems arise in the selection of metal and the casting of parts, you will find that the skill and integrity of your foundry is your best insurance that specifications—and delivery schedules—will be met.

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY

The Hamilton Foundry & Machine Co., 1551 Lincoln Ave., Hamilton, Ohio • TW 5-7491

MEETINGS

(Continued from P. 25)

Personnel Management Conference—Cornell University's New York State School of Industrial and Labor Relations, August 1-4, Ithaca, New York.

Metallurgical Society of AIME—Semiconductors conference, Aug. 30—Sept. 1, Ambassador Hotel, Los Angeles. Society headquarters, 29 W. 39th St., New York.

SEPTEMBER

Air Moving and Conditioning Assn., Inc.—Annual meeting, Sept. 10-14, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, 2159 Guardian Bldg., Detroit.

Non-Ferrous Founders' Society—Annual meeting, Sept. 17-21, Shawnee Inn, Shawnee-on-the-Delaware, Pa. Society headquarters, University Bldg., 1604 Chicago Ave., Evanston, Ill.

Pressed Metal Institute — Annual meeting, Sept. 24-28, The Grand Hotel, Point Clear, Ala. Institute headquarters, 3673 Lee Rd., Cleveland.

American Welding Society — Fall meeting, Sept. 25-28, Adolphus Hotel, Dallas, Texas. Society headquarters, 33 W. 29th St., New York.

Assn. of Iron and Steel Engineers—Annual convention, Sept. 25-28, Penn - Sheraton Hotel, Pittsburgh. Assn. headquarters, 1010 Empire Bldg., Pittsburgh.

American Die Casting Institute Inc. and The Die Casting Research Foundation—Annual meeting, Sept. 27-28, Edgewater Beach Hotel, Chicago. Institute headquarters, 366 Madison Ave., New York.

American Production and Inventory Control Society—Annual national conference and technical exhibit, Sept. 28-29, Pick-Congress Hotel, Chicago. Society headquarters, 330 S. Wells St., Chicago 6.

Operational July, 1961

The mammoth tower of Portland Public Docks giant new straight-line bulk unloader looms 130 feet above the 1220-foot pier as construction nears completion of the fastest bulk discharging facility on the Pacific Coast. The electrically operated, Dravo-built tower will permit direct transfer of cargo from ship to rail, truck or to open storage. The unloader will have a rated capacity of 900 tons-an-hour and the tower travels on rail tracks a distance of 585 feet along the pier. The tremendous weight of the tower is supported by a concrete dock and by nearly 13 miles of pre-stressed, pre-cast concrete pilings.

PORTLAND PUBLIC DOCKS

Operated by the Commission of Public Docks
3070 N. W. Front, Portland, Oregon
CA 8-8231 • TWX PD309U • Cable "DOCOM"

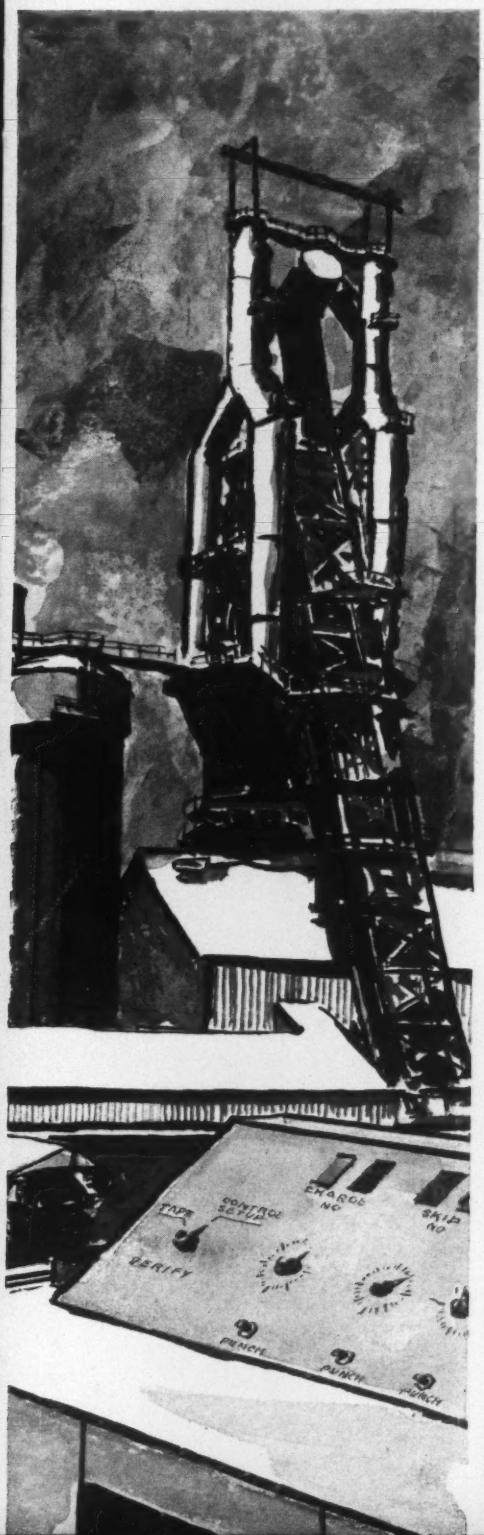
Eastern Rep.: Buckley & Co., 170 Broadway, New York 38, New York

FOR QUALITY... PRODUCTIVITY ... PROFIT

BLAST FURNACES
AUTOMATED BY GENERAL ELECTRIC

Take "guesswork" out with General Electric

of charging; get increased iron output automated blast-furnace control system



Charge your blast furnace with exact amounts of materials in proper sequence at the desired time with new General Electric control. G.E.'s blast-furnace control automatically charges ore, coke, and stone on demand from the furnace according to predetermined selections set into the operator's control panel. Accuracy of this control permits 100 percent utilization of charging equipment for extended periods. You operate equipment with only the necessary capacity to supply desired furnace output. There's no need for extra capacity to compensate for operator fatigue or inability to meet furnace requirements with manual operation of the complex stockhouse. You increase furnace output with less investment.

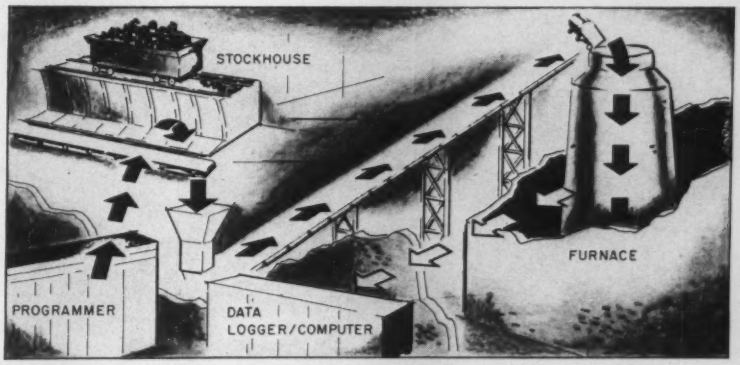
The entire charging operation is sequenced and interlocked to maintain desired furnace output, from material selection in the stock bins to the time the iron is tapped. To obtain desired iron quality, the operator selects only the necessary transfer switches, pushbuttons, and dials for sequence, type and amount of materials. The automated control takes it from there. General Electric's *DIRECTO-MATIC** control is the "mind" of the system, activating every charging step in proper sequence. Indicating lights on the panel keep the operator informed of every phase.

This new charging system reflects General Electric's continued control leadership for the steel industry for over 75 years. Let your General Electric sales representative work with you in automating your blast furnace, or in planning complete electrical systems for any process control. Or, write Section 785-18, General Electric Co., Schenectady 5, N. Y. *Industry Control Dept., Salem, Va.*

* Trade-mark of General Electric Company.

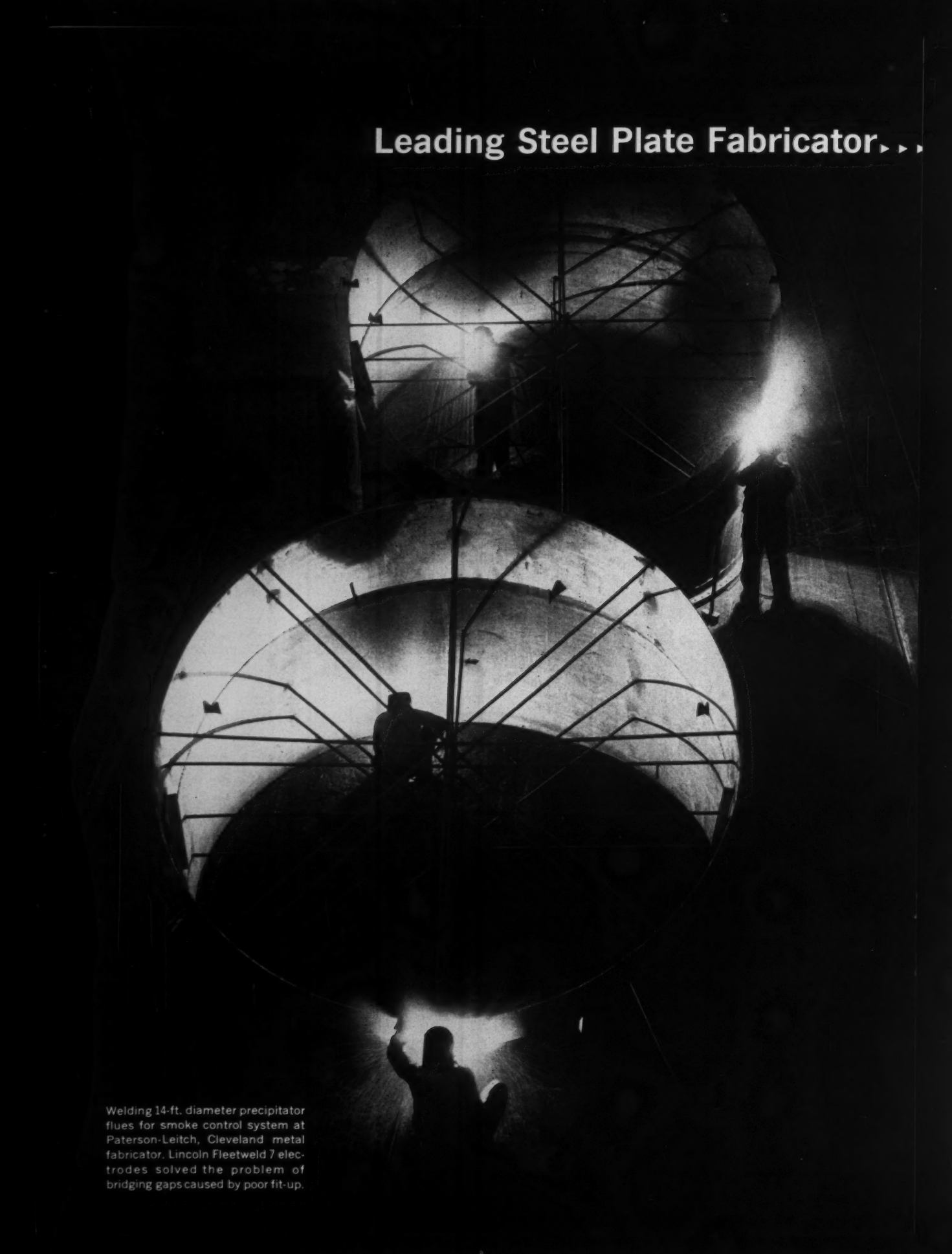
Progress Is Our Most Important Product

GENERAL ELECTRIC



A DATA LOGGER/COMPUTER, added to General Electric's charging control, can accumulate feedback on temperatures, pressures, and chemical analyses of burden during operation (white arrows). Following laboratory study, furnace operations based on this data can be set into the computer and the simulated results typed out. If the computer indicates desired output, the operation can be set into the programmer and experimentally run through the furnace (black arrows). Ultimately, the data logger/computer and programmer can be connected for complete automatic control of the entire furnace operation.

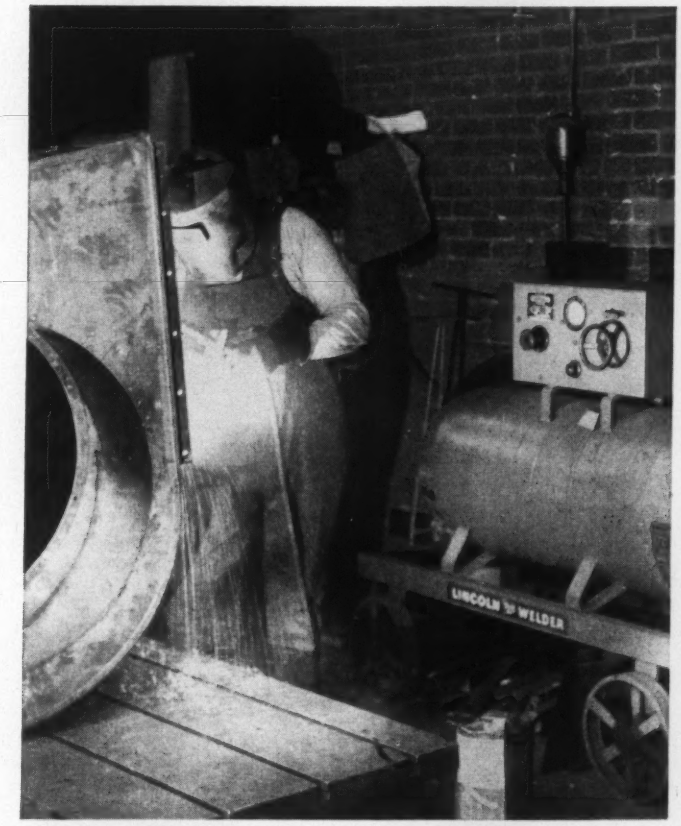
Leading Steel Plate Fabricator...



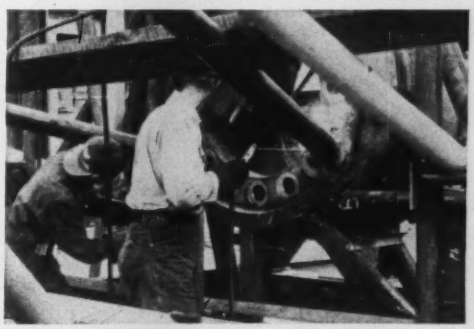
Welding 14-ft. diameter precipitator flues for smoke control system at Paterson-Leitch, Cleveland metal fabricator. Lincoln Fleetweld 7 electrodes solved the problem of bridging gaps caused by poor fit-up.

....ELIMINATES FIT-UP PROBLEM WITH LINCOLN FLEETWELD 7 ELECTRODE

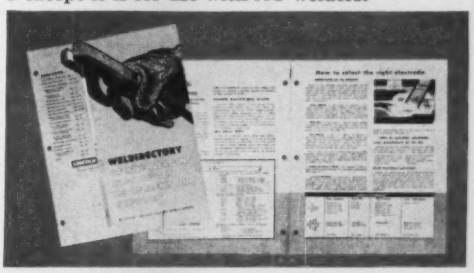
Fleetweld 7 is particularly suited to jobs with poor fit-up. Fleetweld 7MP has iron powder added to its coating to get still higher speeds, greater deposition rates. But, these are only two of a whole family of Lincoln Fleetweld electrodes for welding mild steel.



Here, Fleetweld 37 is used to weld fan blower housing. Its easy operation, fine appearance are important in all-position welding. Fleetweld 7MP, metal-powder brother to 7, is excellent where both speed and bead appearance are important.



Fleetweld 5, best-known electrode ever made is an all-purpose, all-position electrode, excellent for maintenance and general welding jobs. Another Fleetweld electrode, 5P, though generally similar to 5, was expressly designed to give the finest X-ray results on pipe. Fleetweld 35 is identical to 5 except it is for use with AC welders.



Each Lincoln electrode has been designed to do a particular job particularly well. Be sure you select the right one for your job. Call your local Lincoln welding specialist. No obligation, of course. Meanwhile, get your copy of the Lincoln Weldirectory, your guide to welding electrode selection. Write, The Lincoln Electric Company, Department 1931, Cleveland 17, Ohio.

LINCOLN ELECTRODES

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT AND ELECTRODES

These advantages yours–with Timken®

COMPLETE SERVICE—FAST DELIVERY

Call these modern Steel Service Centers

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ALABAMA	
Birmingham	O'Neal Steel, Inc.*†
ARIZONA	
Phoenix	Earle M. Jorgensen Co.*†•
CALIFORNIA	
Los Angeles	Allen-Fry Steel Company*
	Baker Steel & Tube Co. •
	Coulter Steel & Forge Co.*†
	Earle M. Jorgensen Co.*†
	Kilsby Tube Supply, Division of Republic Supply Co. of Calif.•
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
	Tube Distributors, California, Inc. •
	Tubesales•
Oakland	Coulter Steel & Forge Company (Emeryville)*†
	Earle M. Jorgensen Co.*†
	Joseph T. Ryerson & Son, Inc.*•
San Francisco	Baker Steel & Tube Co.•
	Earle M. Jorgensen Co.*†
	A. Milne & Co., Inc. (Burlingame)†
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Denver	Earle M. Jorgensen Co.*†•
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Atlanta	A. Milne & Co., Inc.†
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Chicago	Chicago Tube and Iron Co.•
	Hy-Alloy Steels Co.*•
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	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
INDIANA	
Ft. Wayne	Tubular Sales•
Indianapolis	The Peninsular Steel Co.†
KANSAS	
Wichita	Earle M. Jorgensen Co.*†•
LOUISIANA	
New Orleans	Earle M. Jorgensen Co.*†•
MASSACHUSETTS	
Boston	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc. (Allston)*•
MICHIGAN	
Detroit	Alloy Steels, Incorporated†
	A. Milne & Co., Inc.†
	The Peninsular Steel Co.†
	Joseph T. Ryerson & Son, Inc. •
	Service Steel Division Van Pelt Corp.•
	Tubular Sales•
Grand Rapids	The Peninsular Steel Co.†
MINNESOTA	
St. Paul	Paper, Calmenson & Company*
MISSISSIPPI	
Jackson	O'Neal Steel, Inc.*†
MISSOURI	
St. Louis	Ford Steel Company†
	Joseph T. Ryerson & Son, Inc.*•
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Elizabeth	A. B. Murray Co., Inc.•
Englewood	Tubesales•
Jersey City	Joseph T. Ryerson & Son, Inc.*•
Kenilworth	A. Milne & Co., Inc.†
Linden	Bowsteel Distributors Corporation*
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	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
Garden City (L.I.)	Tube Distributors Co., Inc.•
New York	A. Milne & Co., Inc.†
NORTH CAROLINA	
Charlotte	Joseph T. Ryerson & Son, Inc. •
OHIO	
Akron	The Peninsular Steel Co.†
Cincinnati	Ford Steel Company†
	Joseph T. Ryerson & Son, Inc. •
	SAE Steels, Inc.*
	Service Steel Division Van Pelt Corp.•
Cleveland	A. Milne & Co., Inc. †
	The Peninsular Steel Co. (Bedford Heights)†
	Joseph T. Ryerson & Son, Inc.*•
	SAE Steels, Inc.*
Dayton	Alloy Steels, Incorporated†
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	The Peninsular Steel Co.†
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OKLAHOMA	
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OREGON	
Portland	Pacific Machinery and Tool Steel Co.†
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	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc.*•
TENNESSEE	
Chattanooga	O'Neal Steel, Inc.*†
TEXAS	
Dallas	Earle M. Jorgensen Co.*†•
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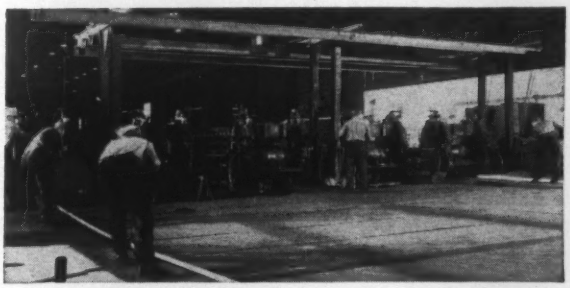
* Alloy Steel Bars and Billets † Graphitic Tool Steels • Seamless Steel Tubing

Steel through Steel Service Centers

100% MILL INSPECTED—FINEST QUALITY

Tubing, bar stock, forging billets and tool steels

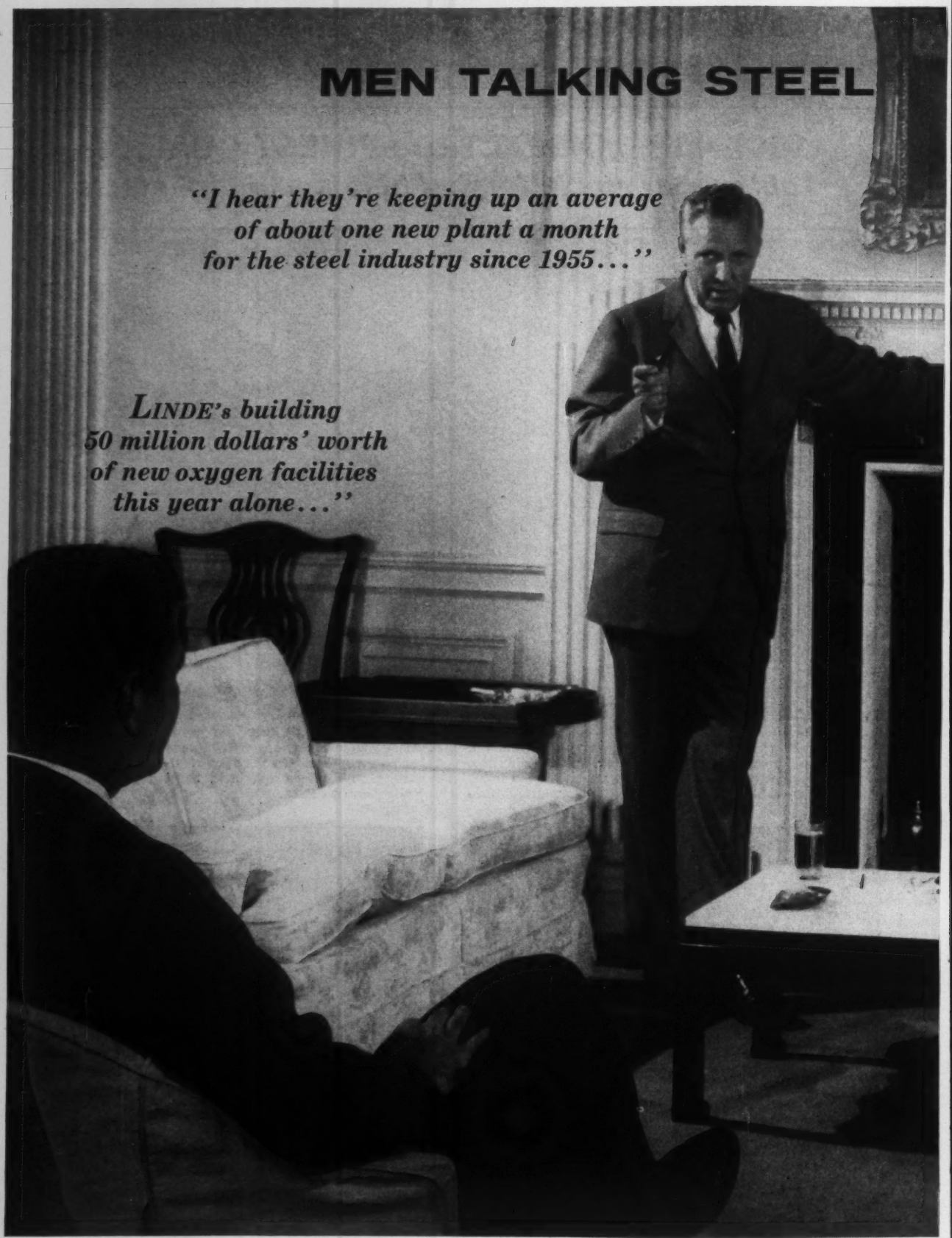
Your Steel Service Center supplies Timken® seamless steel tubing in carbon, alloy and stainless grades. And the Timken Company's 100% final inspection—of dimension, surface and internal quality—assures you it's the finest tubing available. Your Steel Service Center helps you save in other ways, too. It frees your inventory capital . . . releases your inventory space for more productive use. And you're assured of fast delivery of steel ready for use, cutting your processing cost, helping you maintain production schedules.



Timken graphitic tool steels are the most stable tool steels you can buy. Developed by Timken Company metallurgists, their structure contains a combination of free graphite particles and diamond hard carbides that gives you easier machinability and longer wear than ordinary tool steels. They are available only from your Steel Service Center.

You can get Timken alloy steel bars in a wide range of sizes and analyses. And when you use Timken steel, technical help is available from the Timken Company's own steel experts. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN® *Fine Alloy* STEEL


MEN TALKING STEEL
"I hear they're keeping up an average of about one new plant a month for the steel industry since 1955..."
LINDE's building 50 million dollars' worth of new oxygen facilities this year alone..."

ARE TALKING LINDE OXYGEN

"Our LINDE on-site plant
has been on the line for three years.
We always had enough oxygen—even
when the power supply was interrupted..."
"Things are moving fast
in the news these days."

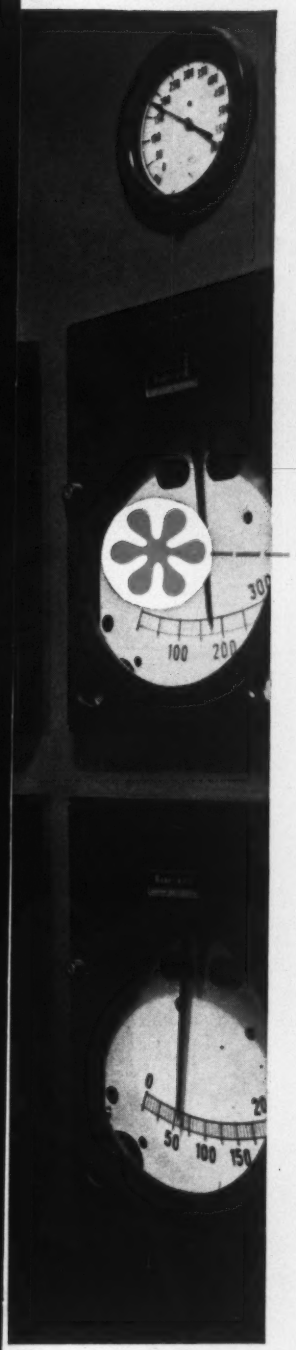
For the full story on how LINDE applies *total gas technology* to on-site plants for steelmakers, write Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada*, Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

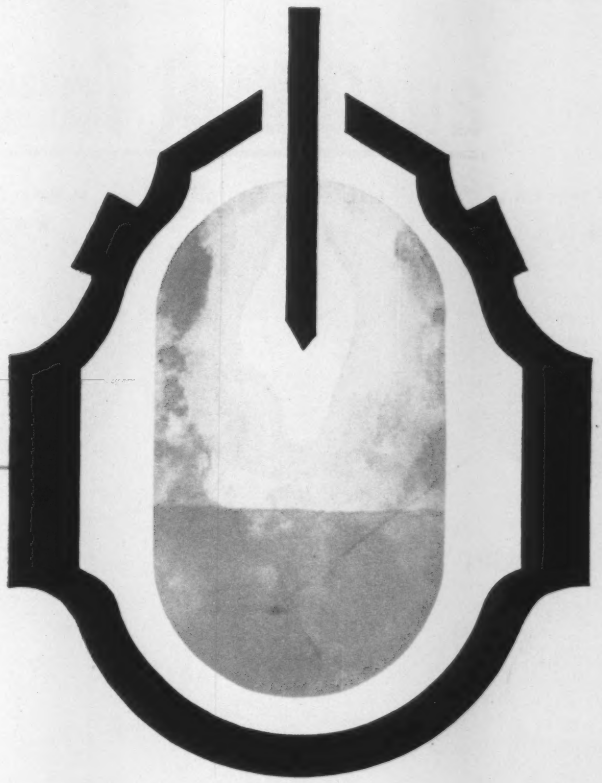
LINDE COMPANY

UNION CARBIDE

"Linde" and "Union Carbide" are registered trade marks of Union Carbide Corporation

At Kaiser Steel Corporation, Fontana, California, this Honeywell system helps double plant capacity by controlling oxygen mass flow, lance position, lance cooling water temperature and pressure, and other critical variables. At left, an operator watches charging of one of the three new oxygen converters from a window in the control pulpit.





Why did Kaiser select Honeywell instrumentation for its L-D process?

At the Fontana plant of Kaiser Steel Corporation, Honeywell instruments were selected for the new basic oxygen steelmaking shop. This new process required instruments that were accurate, reliable, and fast enough to deliver the precise integrated control needed.

Kaiser Engineers called on Honeywell to furnish the necessary control instruments.

If you're planning to use the oxygen process—in converter or open hearth—you'll find it profitable to have Honeywell design your entire control system, complete from primary elements to computer, and tailored to the particular requirements of your mill. Your nearby Honeywell field engineer can give you complete details. Call him today—he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

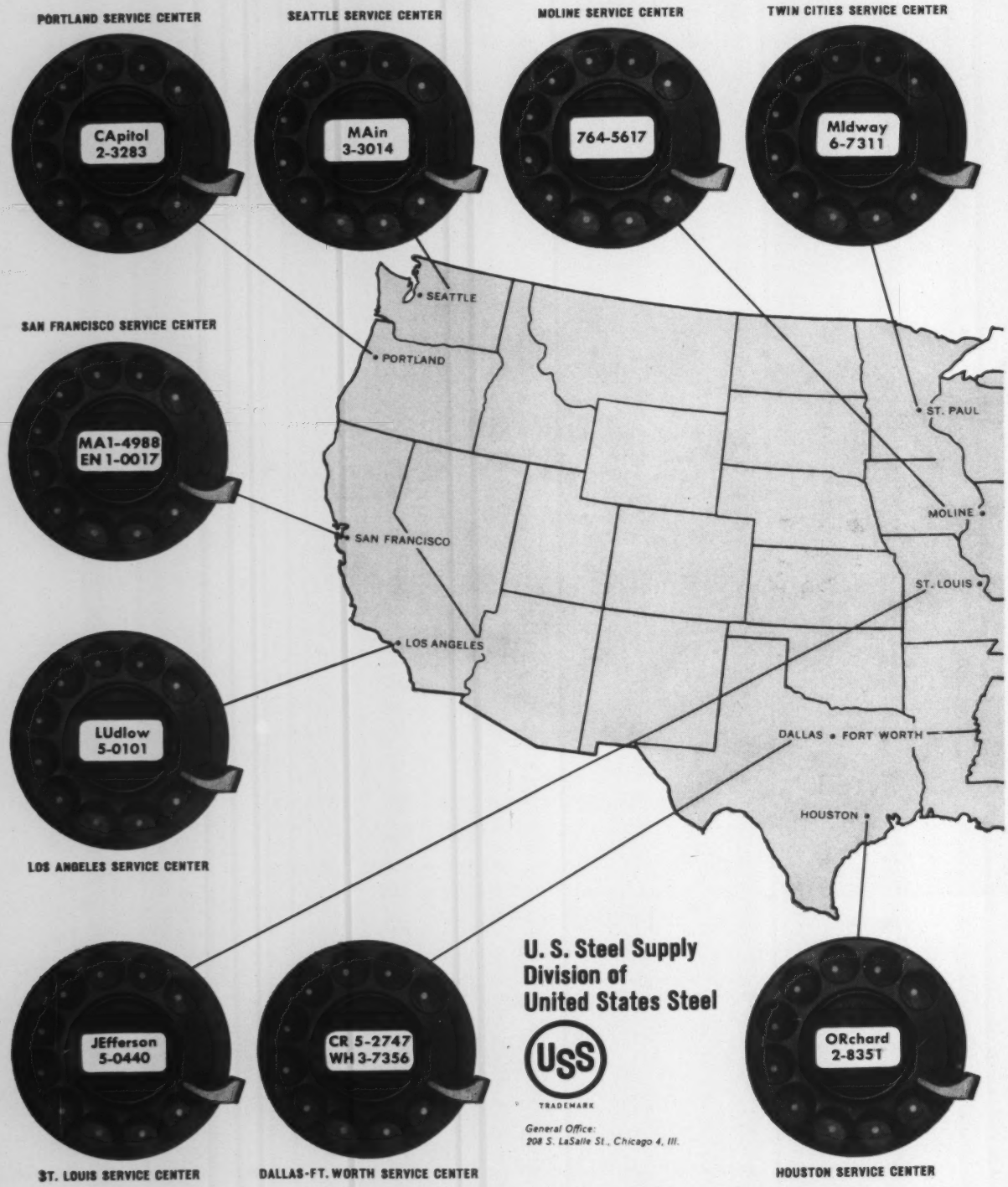
Honeywell

First in Control

SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

If there's a telephone near you, any steel in a hurry from



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Division of
United States Steel

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General Office:
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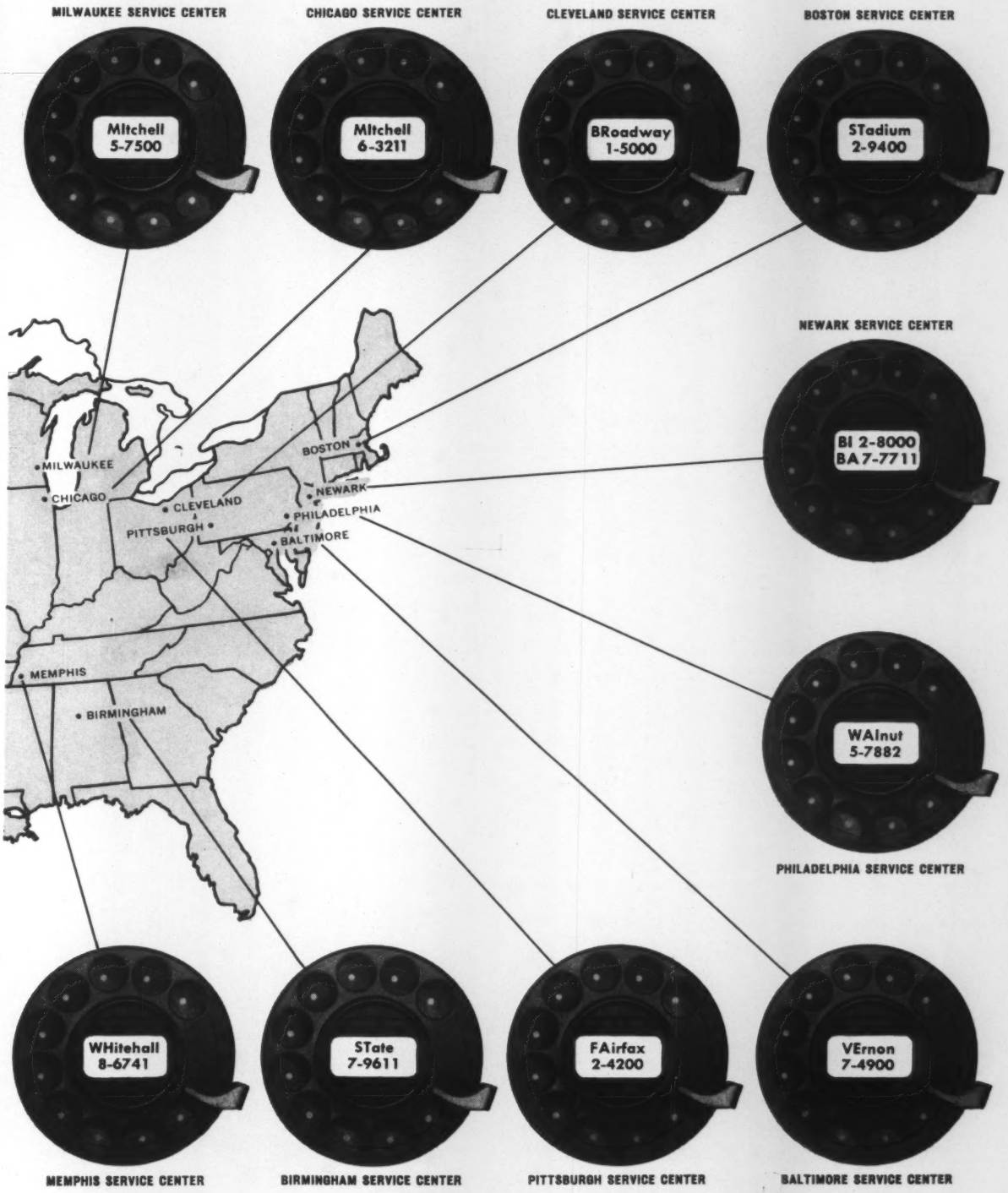
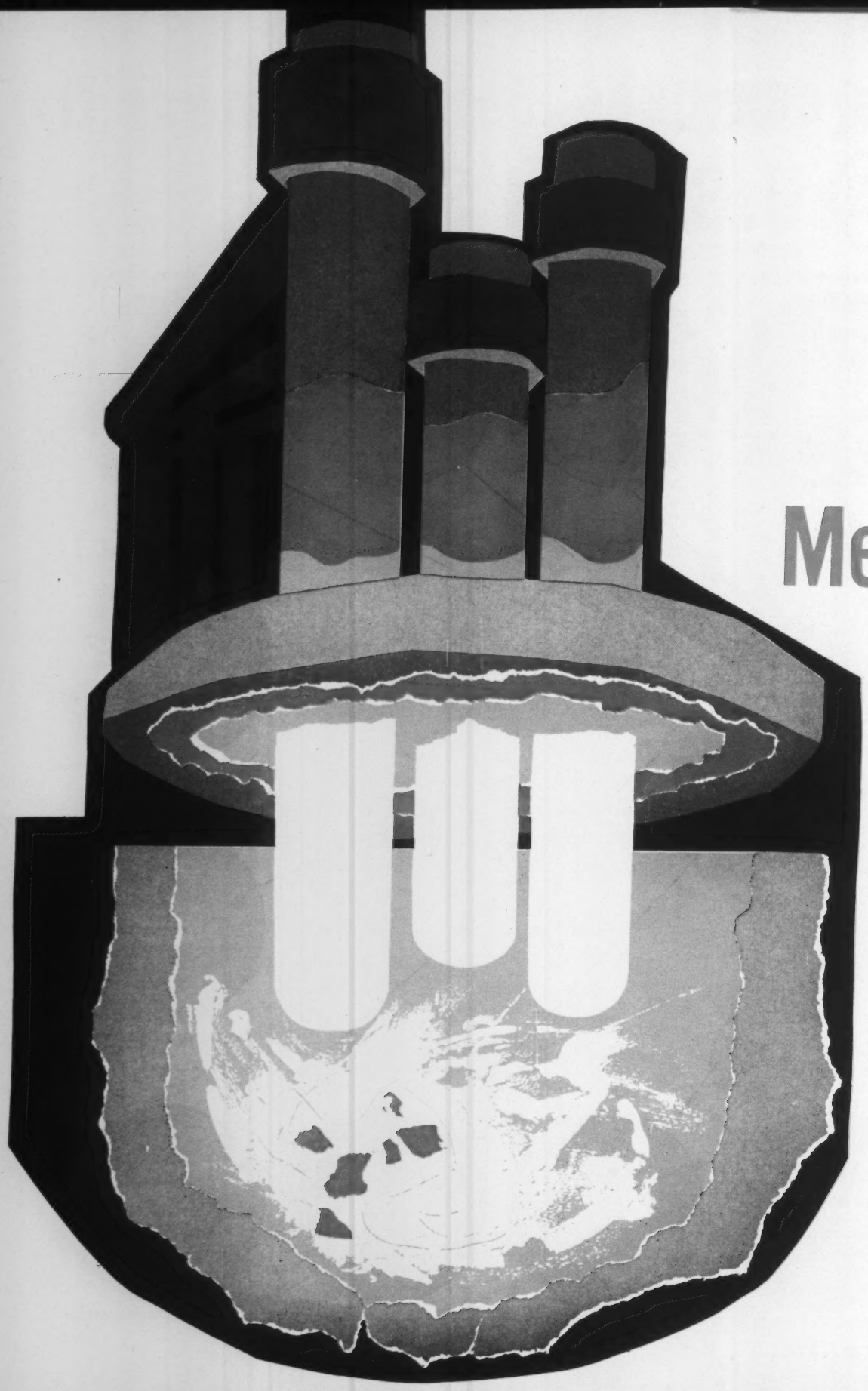
U. S. Steel Supply




Melt

the Cost of Making Steel

with NATIONAL CARBON'S "Four-Point Program"

Steel men know: The heart of the electric furnace is the electrode. Upon it depends so much of the success of furnace operations. But an electrode's performance is based on more than its component materials alone. Electrodes must be *engineered* to meet particular and demanding production conditions . . . and backed up by the supplier's reputation, service and facilities. Let NATIONAL CARBON help you reduce production costs through its "Four-Point Program."

Point 1

75 years of research and production experience in carbon products have built maximum life into "National" electrodes . . . providing more tons of steel per pound of electrode . . . saving the industry millions of dollars in materials and down-time.

Point 2

An industry-wide training program covering electrodes and electric furnace practices . . . designed to provide highest product performance through better utilization of power . . . to reduce refractory maintenance.

Point 3

Advanced electrode packaging and special-device gondolas speed shipments when and where needed . . . to save inventory and storage space . . . to keep investment at the most economical level. National Carbon's pool-car program provides these advantages for customers remote from its plants.

Point 4

Unsurpassed raw material supplies and technical skills at strategically located plants minimize electrode costs.

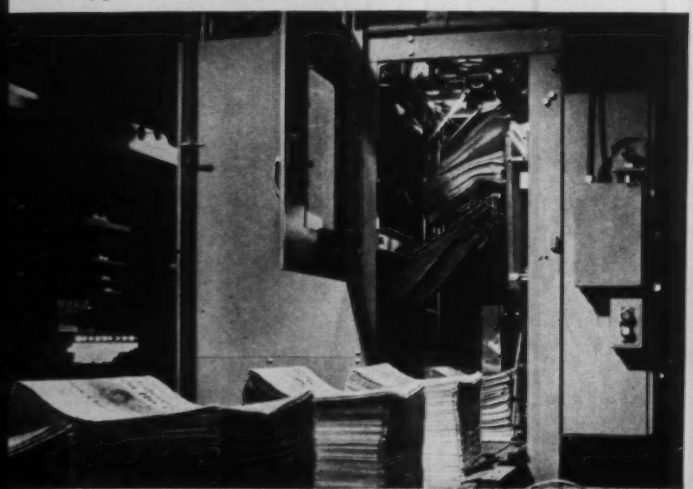
"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

Division of Union Carbide Corporation, 270 Park Ave., New York 17, N.Y.

UNION CARBIDE

No more hand stacking. This newspaper counter-stacker counts and stacks newspapers automatically—and can be programmed to automatically vary the stacks to meet route schedules.



No more dry pumping. Cutler-Hammer's new development—an automatic pump off control for stripper oil wells—stops the pump when oil has been lifted. Saves the pump, ups production.

What's new in control for automation?

A blast furnace that charges itself

More efficient automation because the Cutler-Hammer control systems man was called in at the start of planning. The art of charging a blast furnace is now a science.

Cutler-Hammer control engineers, with the furnace builders, worked three years to put all charging control functions into one integrated system. Now, the proper material in the proper amounts, all in a proper sequence are delivered to the furnace bell—automatically.

Every step of the operation can be checked visually on master control panels. Nothing is left to chance. The added cost of this kind of charging control is relatively insignificant. Complete flexibility in selection of furnace charging programs now makes possible optimum blast furnace performance.

Why you should call in the electrical control man early. Cutler-Hammer has been increasing productivity and lowering costs for many different companies in many different industries for years. This is a major reason why Cutler-Hammer should be called when you *start your automation planning.*

The company on the move. There's a new vitality at Cutler-Hammer—a new desire to solve problems. We've planned for the gigantic expected growth of the sixties and now we're ready—with new plants, new engineering talent, new and better products. We'd like to tell you about ourselves if you're planning ahead. Contact the Cutler-Hammer sales office nearest you.

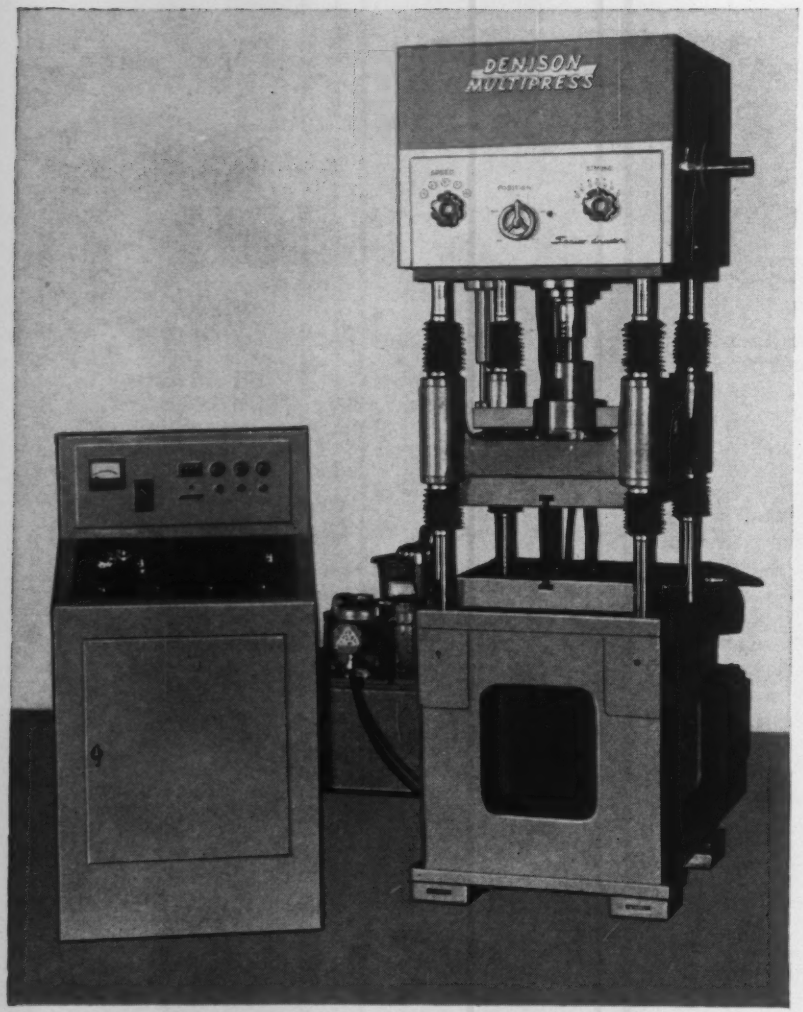
Automation is more efficient when the control expert is called in early.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

Speeding production of progressive stampings with new 600 stroke-per-minute hydraulic Multipress.



DELIVERING MORE THAN 600 RAM STROKES-PER-MINUTE *with 25-ton capacity, new Denison hydraulic Multipress "600" substantially increases speed and precision control of stamping operations. Note construction features, large daylight area, remote control console.*

By: J. S. Tipton

Product Manager,
Multipress Division
Denison Engineering Division
American Brake Shoe Company

Ever-increasing demand for faster, more productive equipment is a basic requirement of the metalworking industry today. And *progressive stamping* is one area in which there has been a particularly urgent need for higher speed precision press equipment.

To specifically meet requirements for faster and more efficient production in progressive stamping operations, Denison has developed the Servo-Driven Multipress "600"—a 25-ton hydraulic press capable of delivering over 600 ram strokes per minute. In addition to its high speed characteristics, this new press has special features that simplify operation, facilitate tooling set-up and change-over...and hold operating noise to a minimum.

FASTER TOOLING SET-UP

The Multipress "600" is a four-column, platen-type press with vertical frame. All four sides of the press frame are open below the bed, providing easy access for faster tooling set-up with reduced change-over time. Bed area between columns is 19½" x 19½". Maximum daylight is 11½", and this is adjustable by means of a simple screw-thread to a minimum of 9".

CONTROLLED BREAK-THROUGH

The press utilizes a closed-circuit servo drive hydraulic system, with harmonic cams for work strokes of ¼", ½", ¾", 1", 1½", 2" and 3". And the cams can be varied to provide special work strokes. Desired stroke length is readily selected by a dial control on the upper front panel. Punch break-through is adjustable by hand-wheel in a smooth, unbroken, continuous manner within the limits of plus-or-minus .250". A scale showing ram position in increments of .001" is adjacent to the hand-wheel. Elimination of positive stops results in quieter operation.

Take-off power for feed and accessory equipment is provided by a drive shaft projecting from both upper right and left sides of the press.

INSTANT ADJUSTMENT

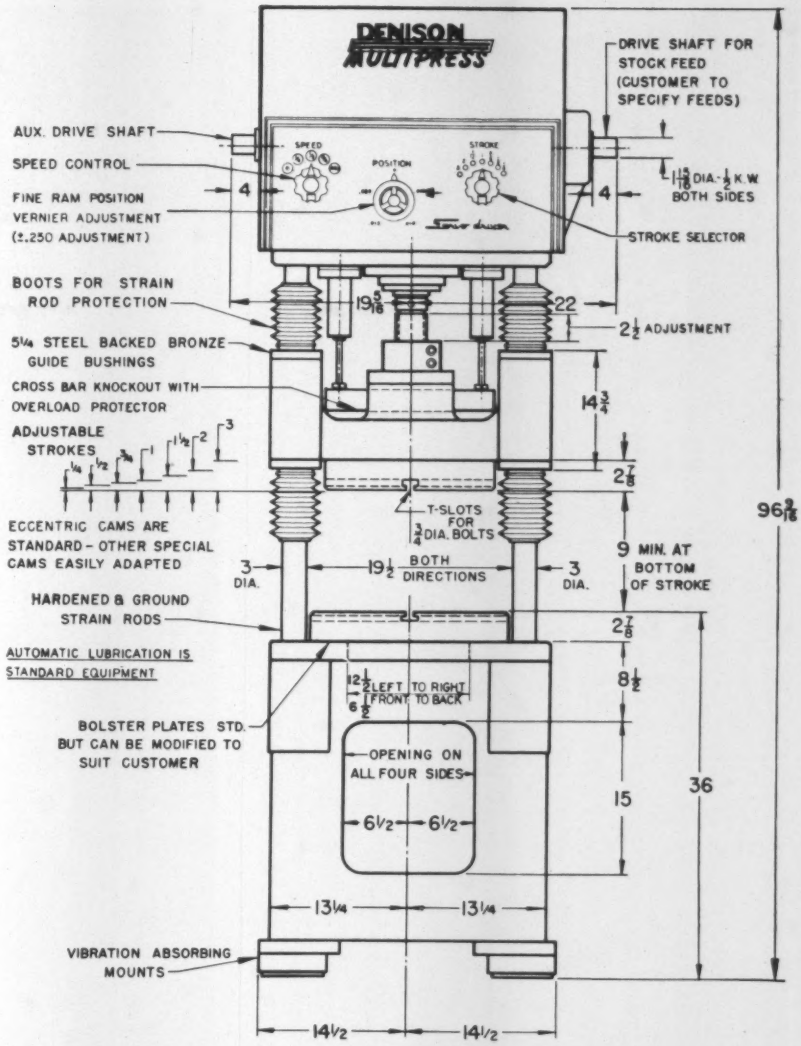
Another important feature of the new Denison "600" unit is that the number of ram strokes, as well as the ram pressure, can be changed while the machine is cycling. Speed of the feed drive shaft is automatically adjusted to any changes in the ram stroke through a servo-loop hydraulic system. This allows instantaneous changes to be made while the press is operating, with perfectly maintained sequencing between feed control and ram action.

Hydraulic power for the press is furnished by a high-low pressure, floor-mounted pump unit. For economical operation, the pump delivers full 25-ton pressure on the lower 20% of the ram stroke only. Ram pressure can be varied by a simple adjustment on the pump unit. On jobs requiring 15 tons pressure and less, full tonnage is available through the entire stroke length.

The pump unit and the press frame are mounted on vibration-absorbing shock mounts to hold noise level remarkably low.

REMOTE CONTROL

All electric controls are panel-mounted on a separate console which may be remotely positioned at any convenient location. These controls include cycle start/stop, motor start/stop, emergency reverse and a multi-selector switch



with positions of off, run, inch and inch-feed. As an optional package, the console may be equipped with an adjustable pre-count system that automatically produces a pre-determined number of parts.

Accessories available for use with the Multipress "600" include feed mechanisms, variable-speed straighteners and various types of bolster plates.

WRITE FOR FREE DATA

Data and specifications on the new Multipress "600", plus information on the complete line of 1-ton to 100-ton capacity Multipress units, are available from your nearby Denison hydraulic press specialist. Call him, or write for technical Bulletin M-42 and the new 26-page Catalog 120.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1242 Dublin Road • Columbus 16, Ohio

These RAS Blowers are in sewage treatment aeration service. They are rated 3000 CFM with discharge at 7.5 PSIG. RAS Blowers are suited to chemical processing, pneumatic conveying, metal working applications . . . wherever a blower is used.

Long periods of continuous operation? All round dependability? Oil-free air? Entrained liquid? Varying pressure? Limited installation space?

Roots RAS Blowers are built for demanding requirements. Rugged construction includes heavy stub-shafts bolted to segmental waist impellers, and conservatively rated pressure lubricated bearings.

RAS Blowers are gas tight, even for hot or light gases. Regardless of varying pressure they deliver a constant volume of oil-free air. Entrained liquids present no mechanical hazards.

Use RAS Blowers to solve your installation problems. Compact, completely enclosed construction not only saves space, it eliminates the need for a base-plate and provides full protection for outdoor installation. Side inlet and discharge connections simplify piping, too.

For maximum dependability—plus more CFM per dollar invested, select the optimum RAS Blower or RGS Gas Pump from 36 sizes, 1500 CFM to 35,000 CFM, with a unit for practically any service from 2 to 12 PSIG.

ROOTS-CONNERSVILLE BLOWER DIVISION • 900 W. MOUNT ST., CONNERSVILLE, INDIANA
In Canada—Roots-Connersville Blower (Canada), Ltd. • 212 King Street, West, Toronto

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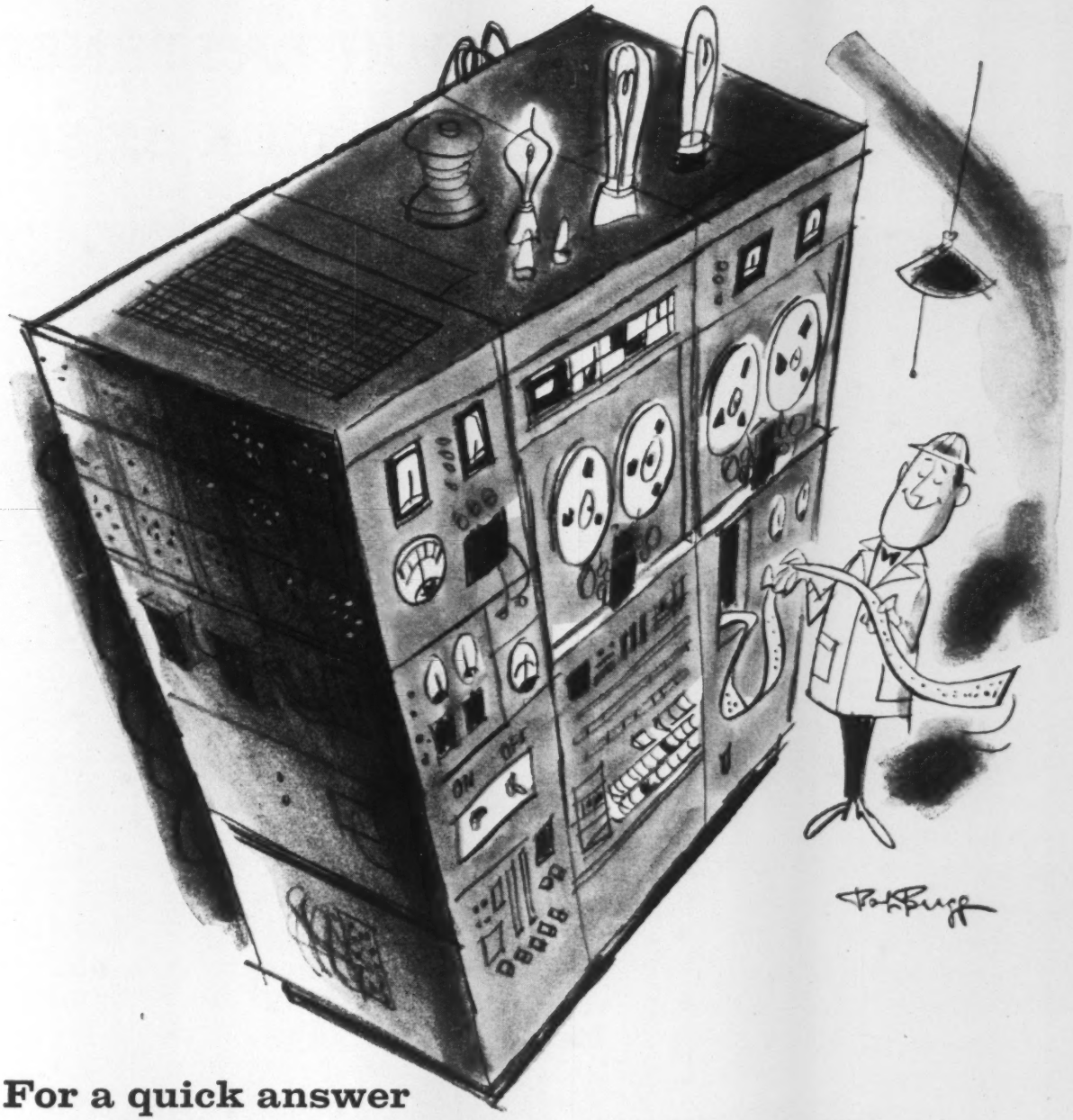

For a quick answer to Exothermic Alloy addition problems

You don't need an electronic brain to measure your additions of Vancoram Exothermic Alloys. They come in steel cans with preweighed alloy content to insure maximum alloying efficiency with minimum cooling effect. Vancoram packaging also affords easy inventory control while eliminating storage and handling losses. Every Exothermic Alloy has been thoroughly tested in laboratory, pilot plant, and in the field. Make a note of these names: THERMOKROM® (Ferrochromium)—THERMOSIL® (Ferrosilicon)—THERMOKROMSIL® (Ferrochrome-silicon)—THERMOVAN® (Ferrovanadium)—THERMOCOL® (Ferrocolumbium). For complete information call or write your nearest VCA District Office. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N.Y.—Chicago—Cleveland—Detroit—Pittsburgh.

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Steel

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Pictured here are a few of the more than 12,000 different fastener and formed part "specials" we've produced for hundreds of satisfied customers. Result: our Special Products Team has the problem-solving know-how to tackle any product requirement that a standard fastener or formed part can't handle.

We'd like to put this experience to work for you—add your "special" to our showcase of precision parts—and prove that we can save you money in the process.

Republic does the job the way that's best for you. We'll completely design, engineer and produce your special—make it from your blueprints, to your specifications—or, produce blanks that are ready for your finish machining.

Newest methods and facilities keep costs down. Cold forming, hot forming, extruding, upsetting (and combinations of these methods) are used to best advantage. Complete machining, heat treating, and surface finishing equipment are also available. Savings realized from this single-source operation mean lower costs to you.

For complete information on Republic's unique capabilities for producing your Fastener and Formed Parts "Specials" send the attached coupon today.

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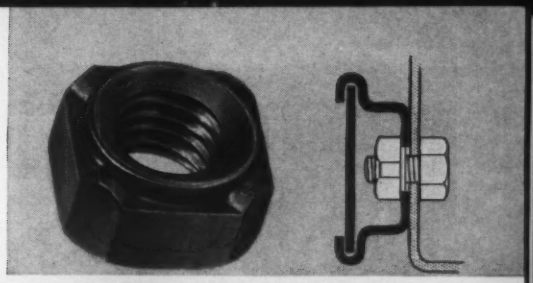

BLIND FASTENING APPLICATIONS are no problem with Republic Midland Weld Nuts—newest addition to the more than 20,000 different types and sizes of Republic Fasteners. They save time, cut costs. Simply premount in places where a wrench can't reach, spot weld in seconds with standard projection welding equipment. Circular pilot guides Republic Midland Weld Nuts into position, protects threads, simplifies automatic feeding. Send for data.

CUT THE COST of keeping pace electrically—build in future power capacity with Republic E.M.T. Here's how: for the same price (or even less in many cases) that it would cost for ordinary threaded conduit, you can install Republic ELECTRUNITE® Electrical Metallic Tubing in the next larger size. And, with E.M.T., you have a pull-in, pull-out wiring system that can be expanded simply by adding or replacing wire. Send coupon for more information on E.M.T.

EASY TO FABRICATE, bend, flange, weld, Republic ELECTRUNITE® Stainless Steel Tubing is ideal for a variety of design and engineering requirements. Republic combines leadership in the production of welded tubing, and in stainless and alloy steels to give you close-tolerance I.D. and O.D. concentricity, uniform metallurgical and mechanical qualities. Call your Republic Representative for fast service—price and delivery quotations to you within 24 hours. Mail coupon for more information.

REPUBLIC STEEL CORPORATION
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1441 REPUBLIC BUILDING
CLEVELAND 1, OHIO

Please send more information on:

- ☐ Fastener and Formed Parts "Specials"
- ☐ ELECTRUNITE Electrical Metallic Tubing
- ☐ ELECTRUNITE Stainless Steel Tubing
- ☐ Republic Midland Weld Nut

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Company_____

Address_____

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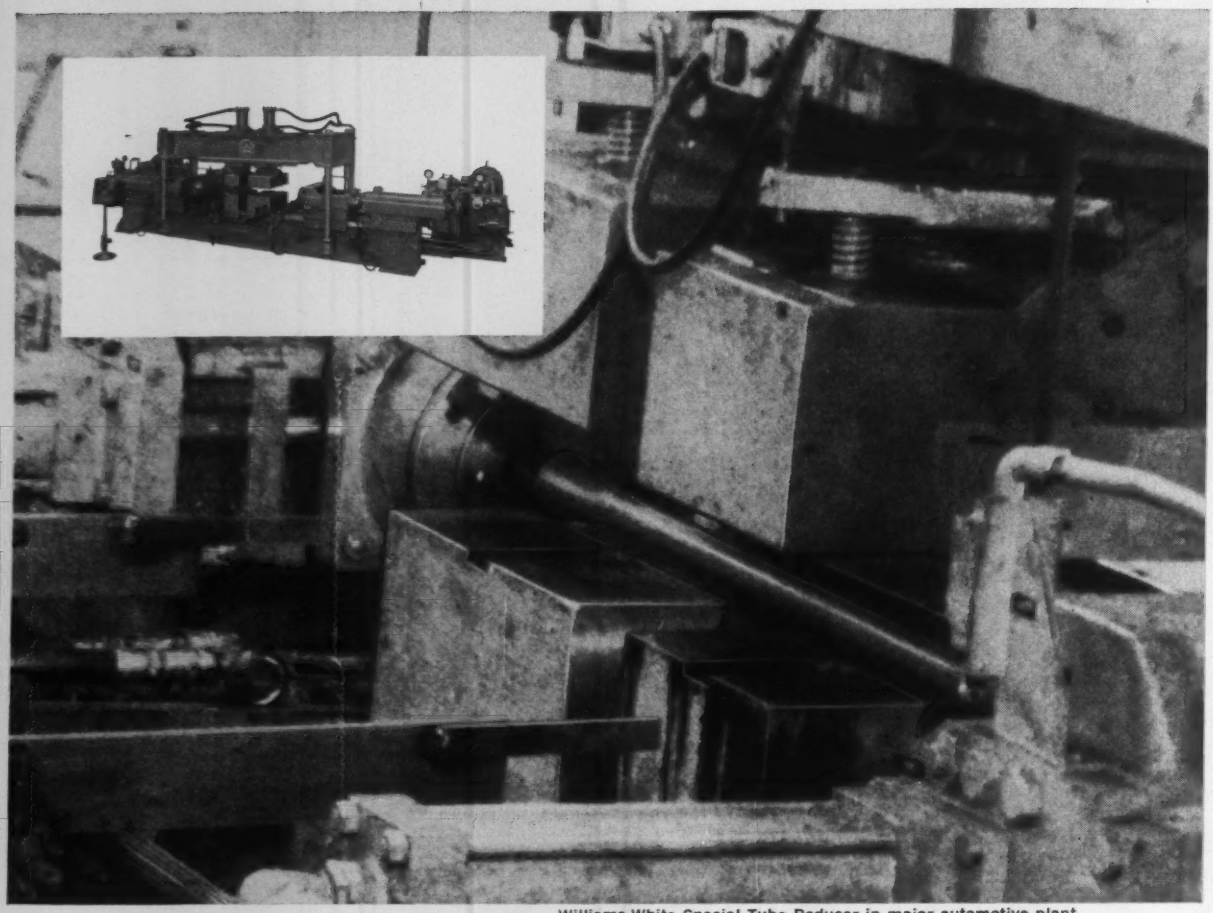


Williams-White Special Tube Reducer in major automotive plant.

Custom Designed--Fully automatic Williams-White TUBE REDUCER

PROBLEM: Design a machine capable of handling torque tubes to 5½" in diameter with a single or double *reduction* or *expansion* operation for *either* or *both* tube ends.

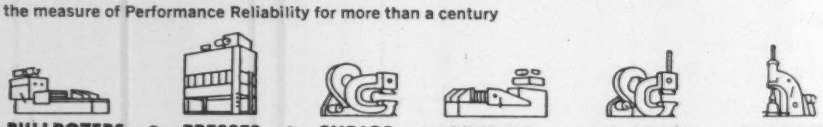
Williams-White engineers tackled this problem, applying the engineering knowledge gained in designing many similar pieces of metal-forming equipment. Double, hydraulically actuated, sliding die heads at each end proved to be the most practical solution for a compact, high-production machine. With this design, position No. 1 may be used for the first pass on a double reduction cycle and position No. 2 for the second pass. Where only one pass is required, production is doubled by completing two parts at each pass.

Williams-White's Special Horizontal Tube Reducer will complete one cycle every 7 seconds using a 6" stroke of the die heads. Maximum production rates are maintained by the utilization of fully automatic loading and unloading equipment.

An example of the wide scope of design and manufacturing capabilities at Williams-White, this special machine illustrates the practical application of engineering know-how gained through the building of metal forming equipment for more than a century. Discuss all of your metal forming applications with experienced W-W engineers.

WILLIAMS-WHITE & CO 600 Third Avenue, Moline, Ill.

the measure of Performance Reliability for more than a century



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McLOUTH STAINLESS STEEL—the CLEAN metal for kitchens and food handling.

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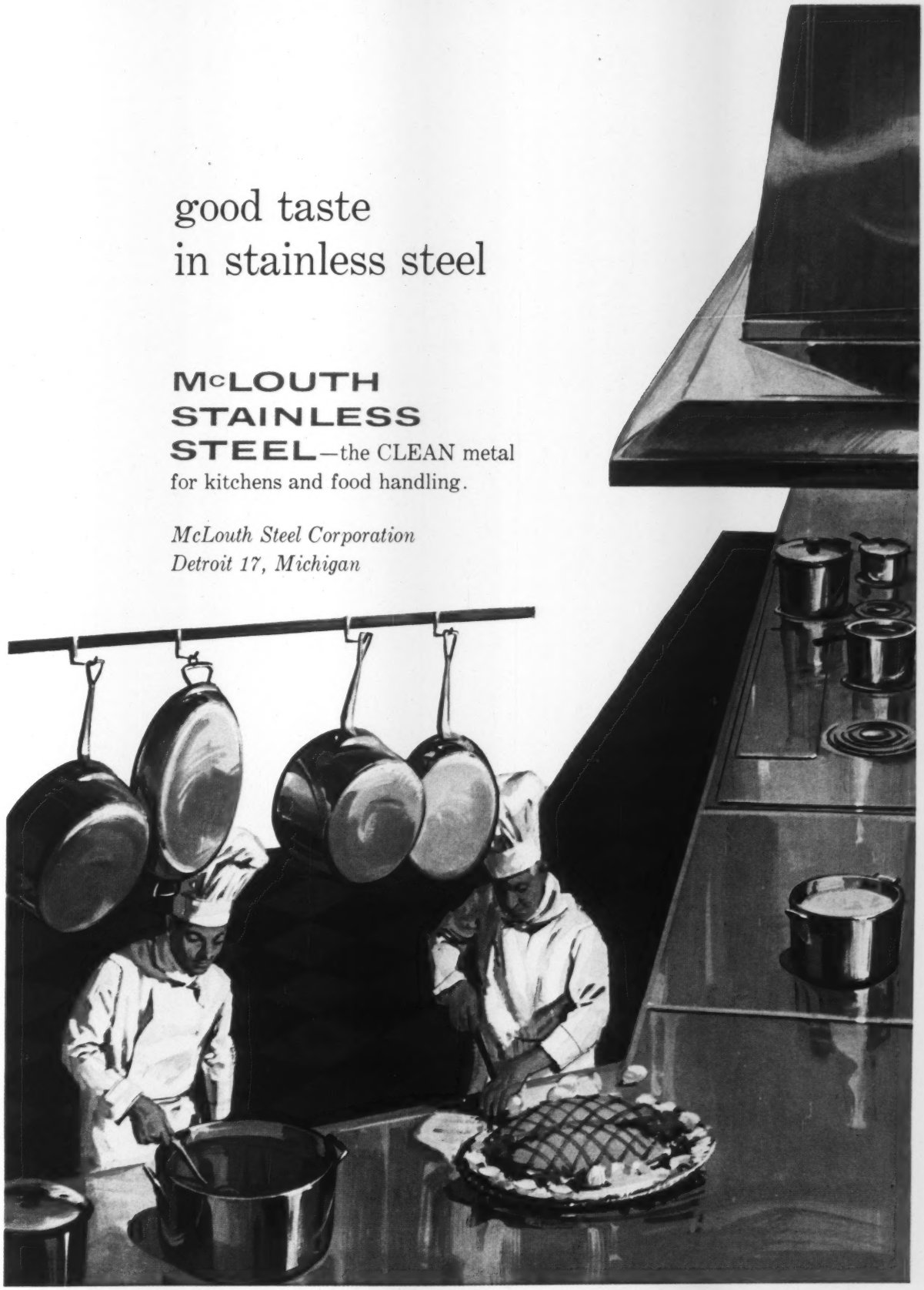
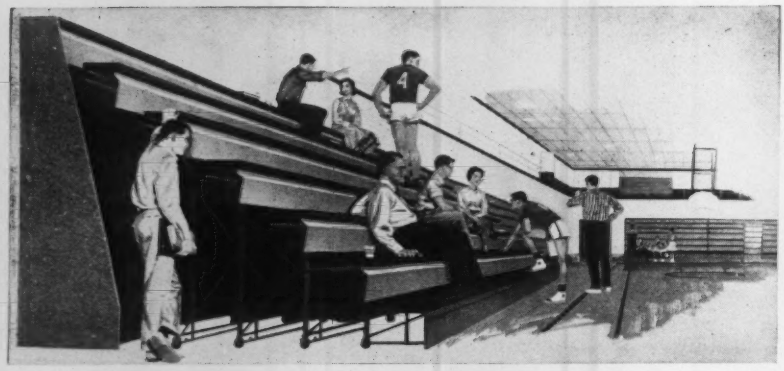


How to use Clad-Rex vinyl-clad metal in the design and engineering of school equipment and other products



Vinyl-on-Steel Folding Gymnasium Seating by Brunswick

The sheet metal nature of Clad-Rex vinyl-clad metal would seem to indicate generally how it can be used. However, the unusual characteristics added by the vinyl coating itself make the areas of usage much broader than might be expected. So as not to overlook possible applications within your product line, consider Clad-Rex as a basic material. Measure each of its advantages against the individual parts and subassemblies of your products as well as the whole enclosure. In this manner your manufacturing methods and costs, sales appeal, and product profit can be best helped.

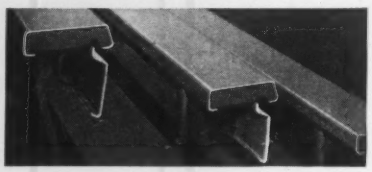
The sales appeal of Clad-Rex vinyl-clad metal

The vinyl surface of Clad-Rex is in fact, a finish. It is available in a broad range of colors and embossed textures. Actually Clad-Rex provides an almost unlimited variety of stock and custom multi-color patterns. Special prints in register can be provided also.

The abrasion resistance of Clad-Rex vinyl-clad metal

The vinyl surface of Clad-Rex, being a poly-vinyl chloride film, offers great resistance to abrasion. Texturing effectively hides even metal-deep cuts in the vinyl surface.

The newly designed folding gymnasium seating (shown above) takes full advantage of the abrasion resistant nature of Clad-Rex vinyl-clad metals. In this application Brunswick is using a practical, yet inviting leather grain pattern. This eliminates



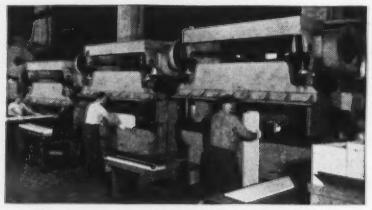
the coldness of painted metal, as well as the relatively delicate finish of wood.

The corrosion resistance of Clad-Rex vinyl-clad metal

Having all the advantages of poly-vinyl chloride, the surface of Clad-Rex vinyl-clad metal protects against acids, alkalis and other corrosive chemicals. It is free of pin holes. As a result, it offers unusual dielectric properties as well. Outdoor weatherable or stain-resistant vinyl-clad metals are also available.

The fabrication of Clad-Rex vinyl-clad metal

Brunswick's methods for fabricating Clad-Rex vinyl-clad metal are much like they used for bare sheet metal.



Finishing, of course, is not needed. Press and brake forming, crimping, punching, expanding, etc., are all practical.

Most important to any remarks about fabrication—although Clad-Rex is obviously different from bare metal, the unusual quality of the vinyl-to-metal bond tends to minimize the difference. As a result, Brunswick fabricates within their own facilities without complex or unusual techniques or tooling.

Although Clad-Rex vinyl-clad metal parts can be assembled with stud and projection resistance welding, some limitations in spot and seam welding do exist. Until the present research for a solution is completed, other conventional methods of joining should be used.

A source of engineering service

Take full advantage of the engineering and research facilities of Clad-Rex. Call or write for Report 6101, "How to Use Vinyl-Clad Metal in the Design and Engineering of Commercial Furniture". *Simoniz Industrial Products, 11506 West King Street, Franklin Park, Illinois (Phone Gladstone 1-2323).*

24C

Clad-Rex Vinyl-Clad Metal is a product of

RESEARCH • DEVELOPMENT • ENGINEERING

SIMONIZ INDUSTRIAL PRODUCTS

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CLAD-REX VINYL-CLAD METALS • **SIMONAIRE** FOAMS AND INDUSTRIAL CHEMICALS
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He's making a Monarch Lathe...

This might be your Monarch Machinability Test Lathe establishing optimum cutting conditions on a difficult turning job. Data is immediately applicable to production conditions.

One example of where the extra values come from—in your MONARCH Lathes

"Building" a lathe? Looks more like "operating" one! Actually this Monarch metallurgical engineer is doing both. You see, that's a Monarch Machinability Test Lathe running one of the thousands of tests that constitute our continuing long-range metal-cutting research program.

Here's where we dig for gold in the chip pan; where we get the answers to all questions posed by the color, size and shape of the chips. Questions like: Is too much heat generated, causing short tool life and work distortion? Is speed too low, with resultant production loss? Is rated horsepower of the machine too low for expected metal removal? Is work finish unsatisfactory? Or in one over-all question, is the inbuilt productiveness of the machine being realized on every cut?

Monarch Lathe design benefits directly, and continually from data so developed. Too, Monarch users find here the answers to knotty problems. Additionally, such data tabulated in our booklet "Speeds and Feeds for Better Turning Results" has become a "must" reference for the whole field of metal turning.

Yes, this man is building Monarch lathes . . . in terms of more profitable performance for every user. THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.

WHEN YOU BUY VALUE
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VISIT MONARCH—*We'll turn your part to return you profit*

New technique makes possible easy-to-machine steel extrusion dies from molybdenum

At 4600°F thorium becomes a liquid. Bismuth boils. Antimony vaporizes. But molybdenum remains hard.

To help you take advantage of molybdenum's hardness — and heat resistance — Sylvania now makes available molybdenum for forging into extrusion dies for steel, titanium and other metals. Thanks to its new isostatic pressing and sintering operation, molybdenum powder of controlled particle size can be formed into forging blanks that permit you to produce intricate shapes and patterns for your dies. Because of molybdenum's high temperature characteristics, these dies far outlast conventional dies. Sylvania also produces billets and ingots for forging, electrodes for arc casting, blanks for machining and machined parts.

Shouldn't you consider refractory metals in meeting your needs? The same properties that solve the problems of throat inserts for rockets and missiles can work for you in piercing points, die-casting dies and cores, in truing grinding wheels and in many other ways. For the full story or help in checking out a special idea write Chemical & Metallurgical Division, Sylvania Electric Products Inc., Towanda, Pennsylvania.

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GENERAL SYSTEM

DSC ECON-O-BRITE STRIP

helps widen your manufacturing margin on nickel-chromium plated steel parts

WHAT ECON-O-BRITE™ IS

ECON-O-BRITE™ is DSC Accutronic® STRIP with our improved Regular Bright Finish for nickel-chromium plating purposes. It is suitable for applications requiring eye-appeal and reliable job-performance—especially where overall costs are closely budgeted.

FIVE WAYS ECON-O-BRITE™ CUTS COSTS

1 Our Regular Bright Finish carries no price "extra"

2 DSC customers dispense with inter-leaving—a sizable cost saving

3 DSC customers report that our deep-rolled brightness and close-grained surface requires scarcely any preparation for plating and also facilitates superior plating results

4 LEVEL GAUGE and EVEN TEMPER—recognized user benefits of DSC Accutronic® STRIP—give you fast, steady, trouble-free stamping and roll-forming operations

5 LEVEL GAUGE enables you to reduce your product's average unit weight

HOW YOU CAN JUDGE ECON-O-BRITE™ FOR YOURSELF

First let us give you the complete story on this performance-proved production material and show you samples *before and after plating*. Then, if you say so, we can evaluate with you the requirements of one of your pet jobs and furnish a sample lot for you to run under your own operating conditions, without any obligation on your part.

As a starter, call your nearest DSC Customer "Rep" or write: DETROIT STEEL CORPORATION, BOX 7508, DETROIT 9, MICHIGAN.

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Time is the measure of productivity

Time is the measure of productivity
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Time is the measure of productivity

Reduce grinding time and you increase productivity. Norton's many time saving innovations in varied stages of grinding production can reduce your grinding time up to 30%! The story is a profitable one. Here's why —

Norton Grinding Machines are engineered to permit higher wheel speeds to reduce cutting time. Norton's *Automatic Wheel Balancer* balances the wheel in *five seconds— on the machine.* You reduce time spent "grinding air" up to 85% because of Norton's *Automatic Wheel Contact Accelerator* which speeds the wheel to the work and compensates for work piece-diameter variation. Another advance is Norton's *Automatic Truing* which eliminates work interruptions and the *Automatic Wheel Wear Compensator* that stabilizes the grinding cycle.

Norton Grinders further add to your productivity by minimizing work spoilage with *Automatic In-Process Gaging.* In the case of surface grinders Norton *Higher Table Speed of 150 fpm* actually reduces grinding time up to 50%.

These are only some of the many reasons you can increase your productivity with Norton Grinders. They also offer accessories that literally transfer skills to machines — *ultra-fine feed,* and *automatic features* such as *steady resting, endwise locating, loading, constant peripheral wheel speed* and *hydraulically-operated feed screws* provide this competitive advantage.

The decision is yours — can you afford not to reduce the time it takes to produce your product? Can you afford not to increase your productivity? Contact your Norton man, NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 5.

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
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NORTON
MACHINE TOOLS

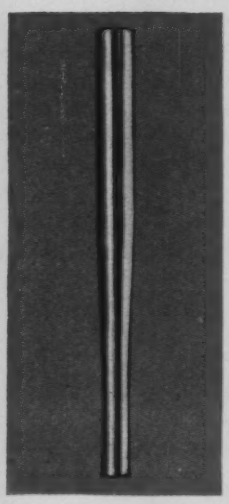
Making better products . . . to make your products better

How METALOGICS* cools off the high-cost hot seat!

The following case histories are typical of how Ryerson Metalogics helps hundreds of companies save money, improve products, and cut production waste.

Metalogics-trained Ryerson specialists help you value-analyze cost-soaring production problems—and they back up their suggestions with unbiased recommendations on exactly the right steel, aluminum or plastic to do each job best for less.

Little wonder, then, that more and more companies across the country find the high-cost hot seat a little cooler after inviting a Ryerson man to value-analyze specific problems, and come up with recommendations. Give him a call—perhaps he can help answer some of your high-cost questions.



*METALOGICS—the Ryerson science of giving optimum value for every purchasing dollar.

PRODUCTION COSTS REDUCED 40%

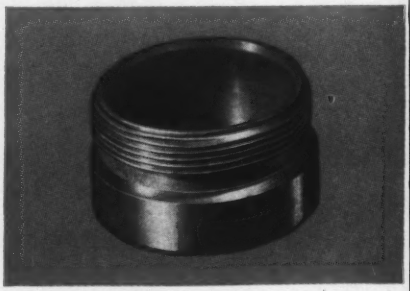
Company was making chrome-plated table legs as a 3-piece weldment and having problems in holding concentricity and making proper preparation for the mirror finish. In addition, production costs were high.

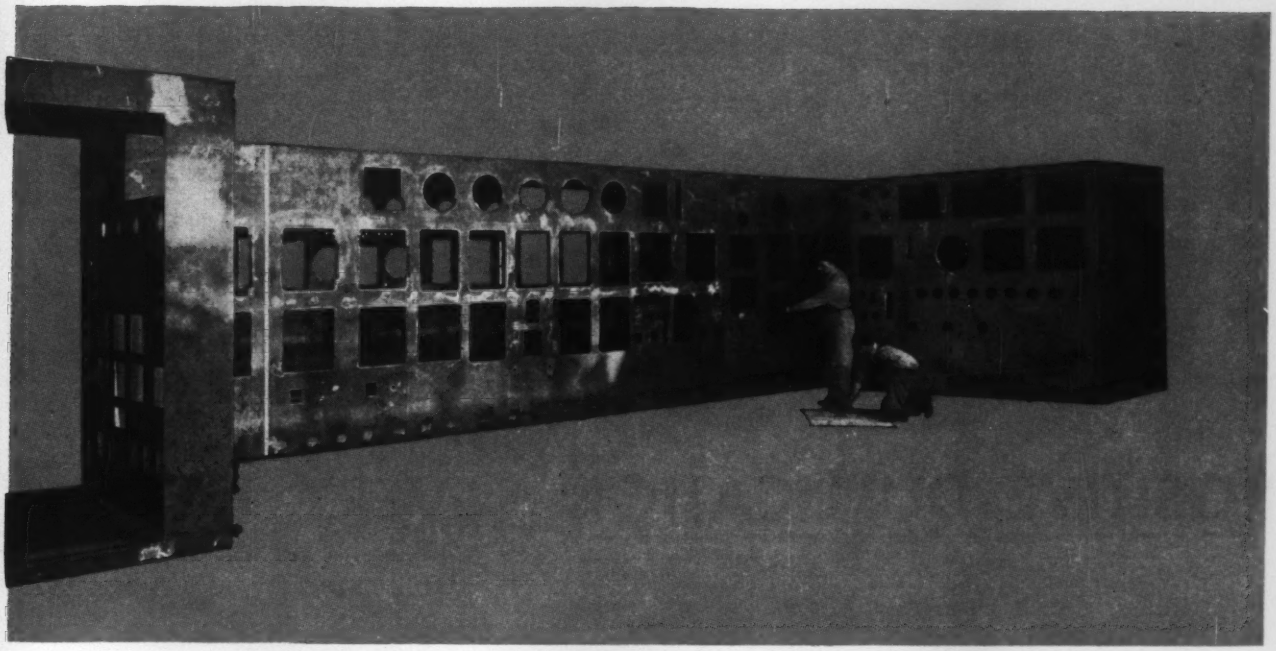
Ryerson recommended this Metalogical solution: make the legs from *one* piece of 3″ O.D. soft-annealed, cold rolled, electric-welded tubing—half the length tapered to 2″ O.D., holding concentricity to 1/32″. Results: surface was just right for chrome plating, and production cost reduced.

THREAD GALLING ELIMINATED

Manufacturer made this special coupling of aluminum to gain the advantages of light weight, corrosion resistance and easy machining. But a problem developed due to galling of threads.

Following the recommendation of a Ryerson Metalogics specialist, the company hard-coated the parts by special low-temperature anodizing which produced a surface hardness of Rockwell 70 C. Galling was eliminated, and corrosion resistance increased. One more example of top technical help from Ryerson.

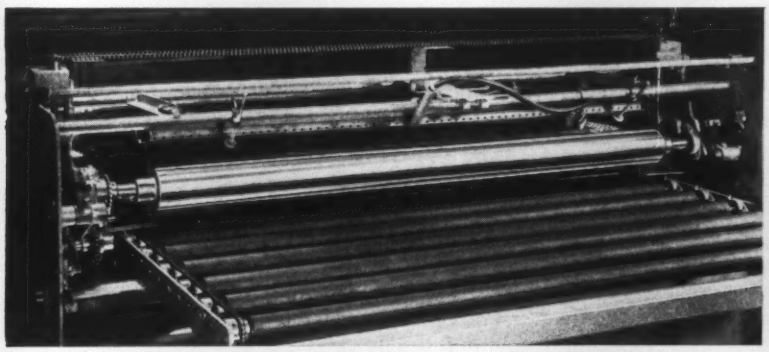




150 OPENINGS BURNED IN HUGE CONTROL PANEL ASSEMBLY

Expert Ryerson flame-cutters burned more than 150 openings in the steel plates that make up this huge control panel assembly.

Each opening had to be located and cut with extreme accuracy to permit proper installation of the complex instrument system. Distortion had to be carefully controlled and a high degree of flatness maintained so that the plates would have a good appearance when painted. All such requirements were readily met by Metalogically-oriented Ryerson service.



One end of close-tolerance roll. Note 3-step machining of bar.

SWITCH TO LEDLOY® STOPS TEARING...CUTS REJECTS

In making this roller coater—Gasway Corp., Chicago—was having trouble machining C-1018 bar stock to produce a close-tolerance roll. Three-step machining was required at both ends of the bar, and tearing was frequent with up to five stops per cut to regrind the tool.

After studying the problem carefully, their Ryerson specialist recommended a change to Ledloy 300. Results from this fast-machining leaded steel: higher production; longer tool life; rejects cut to a minimum.

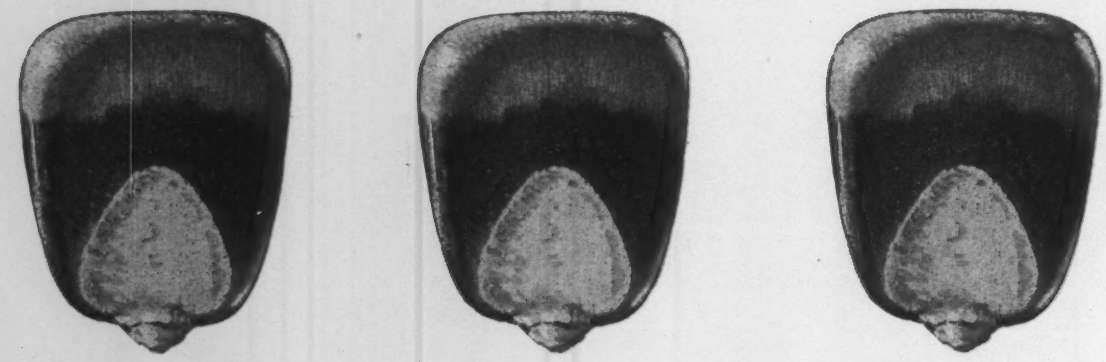
Other steels for this coater, including angles, expanded metal, and cut-to-size side plates, are also supplied by Ryerson.

As P. A. Bill Vastine puts it, "Time and time again Metalogics takes me off the spot. It gives me technical help, plus convenient, dependable, single-source service on all my requirements."

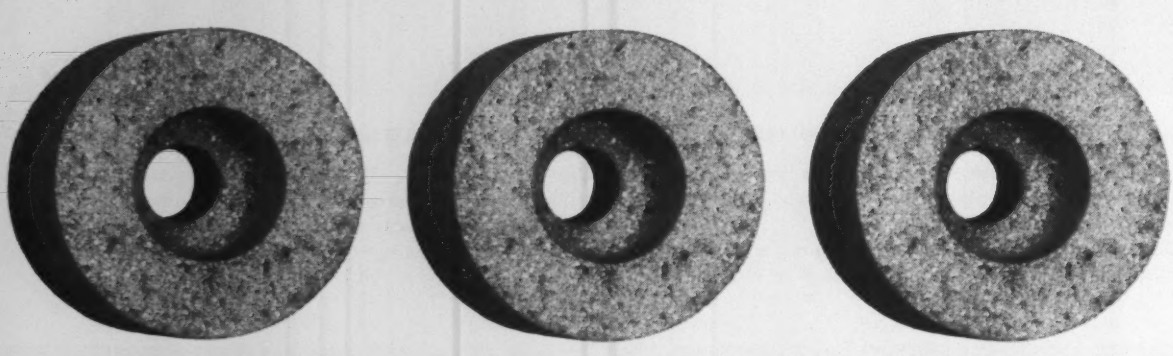
RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND® STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY



POSITIVE DUPLICATION—EVERY TIME!



Each one of these kernels of corn has positive duplication built into it, just as have these internal wheels, and *all* CINCINNATI Ⓟ° GRINDING WHEELS. There are good reasons for this Ⓟ dependability . . . 36 good reasons.

FAMOUS, UNIQUE PROCESS

Three dozen unvarying quality controls govern every step of the famous Cincinnati Ⓟ manufacturing process, unique in the industry.

For example, the atmosphere of the mold room is *climate controlled* with conditions of temperature and humidity that *remain the same* from hour to hour, from day to day, from year to year!

RESULT: UNSURPASSED UNIFORMITY

This extraordinary attention to manufacturing detail results in wheels of unsurpassed uniformity. You can reorder CINCINNATI WHEELS with confidence, because they give you the same good job time after time. You use fewer wheels because Ⓟ wheels last longer.

CALL CINCINNATI TODAY

Factory trained by the Cincinnati Milling Machine Company, our grinding specialists are available to you for consultation on all your grinding problems. Call your CINCINNATI GRINDING WHEELS Distributor, or contact us direct, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Ⓟ POSITIVE DUPLICATION

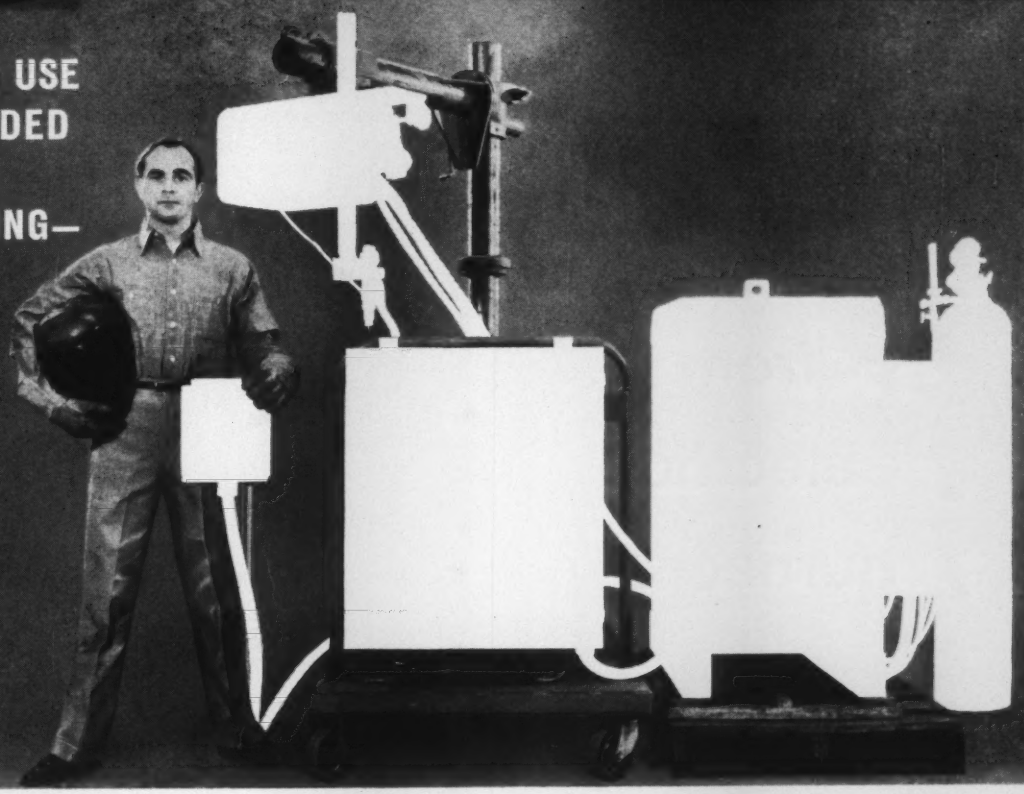
CINCINNATI

GRINDING WHEELS

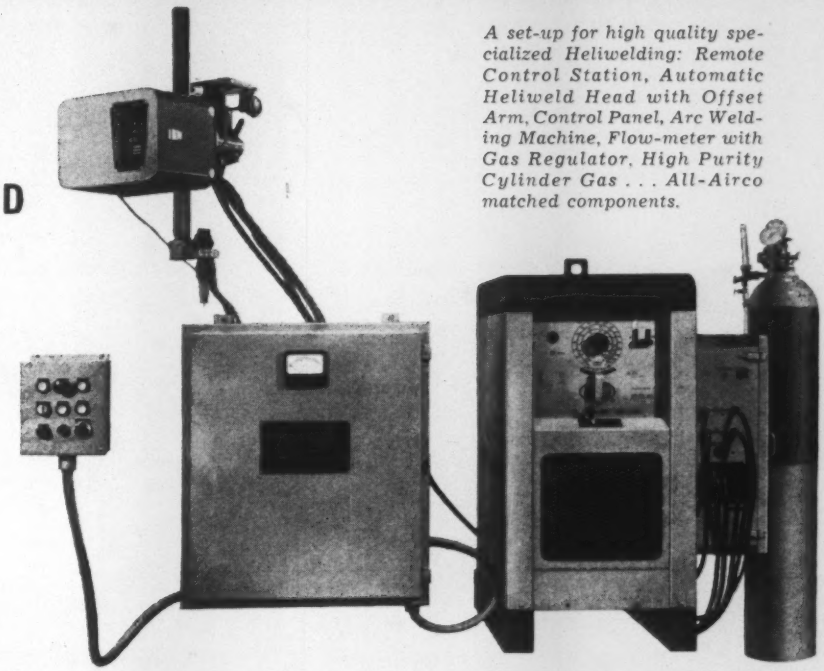
°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

WHEN YOU USE GAS-SHIELDED TUNGSTEN ARC WELDING—



ONLY AIRCO'S HELIWELD LINE GIVES YOU EVERYTHING YOU NEED



A set-up for high quality specialized Heliwelding: Remote Control Station, Automatic Heliweld Head with Offset Arm, Control Panel, Arc Welding Machine, Flow-meter with Gas Regulator, High Purity Cylinder Gas . . . All-Airco matched components.

Planning to weld B-70 air frames? . . . Kitchen equipment? . . . Tubing by the mile? . . . Structurals for giant antennae? . . . ⅛" stainless, foil-fragile aluminum or anything between? **Then Heliweld it!** . . . You can weld it better with Airco inert gas tungsten arc Heliwelding than with any other process set-up available anywhere today!

Why? . . . Because you zero-in on the job. Choosing from the unmatched range of Airco equipment, you get a set-up that's specialized . . . that turns out top quality welds with the precise, unvarying penetration your job demands.

How is it possible? . . . The Airco Automatic Heliweld Head maintains constant arc conditions: the automatic Heliweld Head is more sensitive. It's far faster than human hands. It permits vast savings in hours and dollars.

That's just a fraction of the story. If you want to join metals with top quality welds, quickly and economically, there's one answer only. Call Airco . . . where the big idea is matched with unexcelled experience!

AIRCO®

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated

150 East 42nd Street • New York 17, N. Y.

More than 700 Authorized Airco Distributors Coast to Coast

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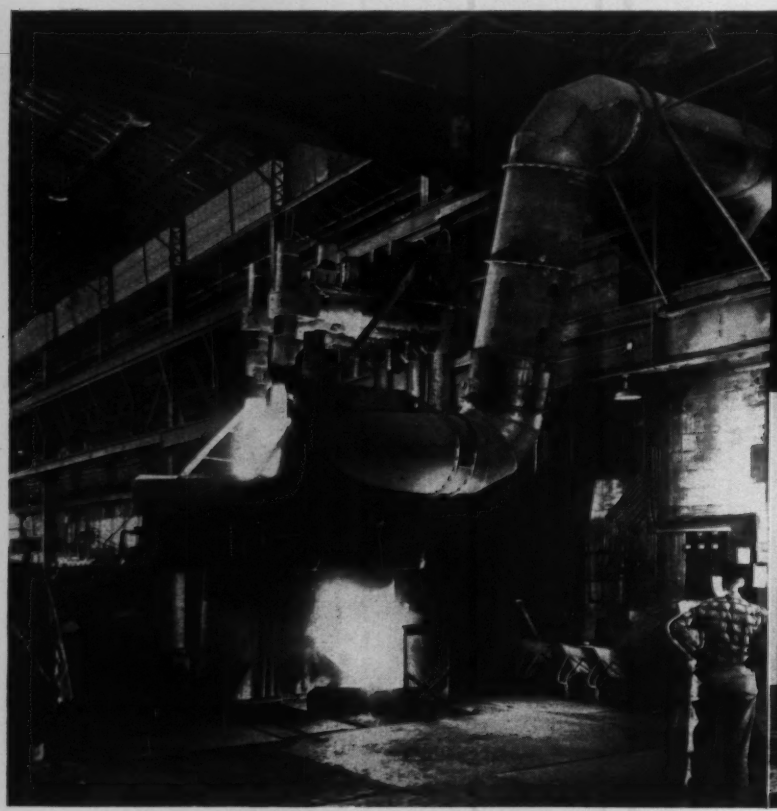
at The National Supply Company, Torrance, California...

clean air from electric furnaces

■ The melting department of National Supply won a quick stamp of approval when they started collecting electric furnace fumes with a high-efficiency Dracco Multi-Bag Filter system. The system uses Dacron bags to clean hot gases and ventilation air coming from three arc furnaces. Capacity of the system is 75,000 cfm—enough to handle normal operating demands and provide a reserve to permit oxygen lancing of the melt. After four years of service, the system continues to meet the requirements of one of the nation's toughest air pollution codes, keeping furnace effluents free of visible particles.

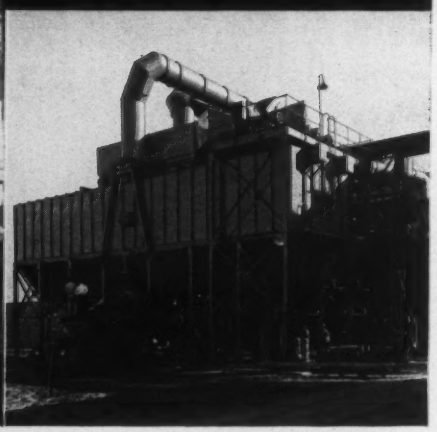
Collecting electric furnace fume is just one of the many capabilities of Dracco cloth filtration techniques. They have been successfully applied to a variety of fume and dust problems throughout the metals industry. If you have an air pollution problem, write Dracco for a cost-saving solution. Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

Dracco Filter System labeled "best in the West" by Los Angeles air pollution control authorities



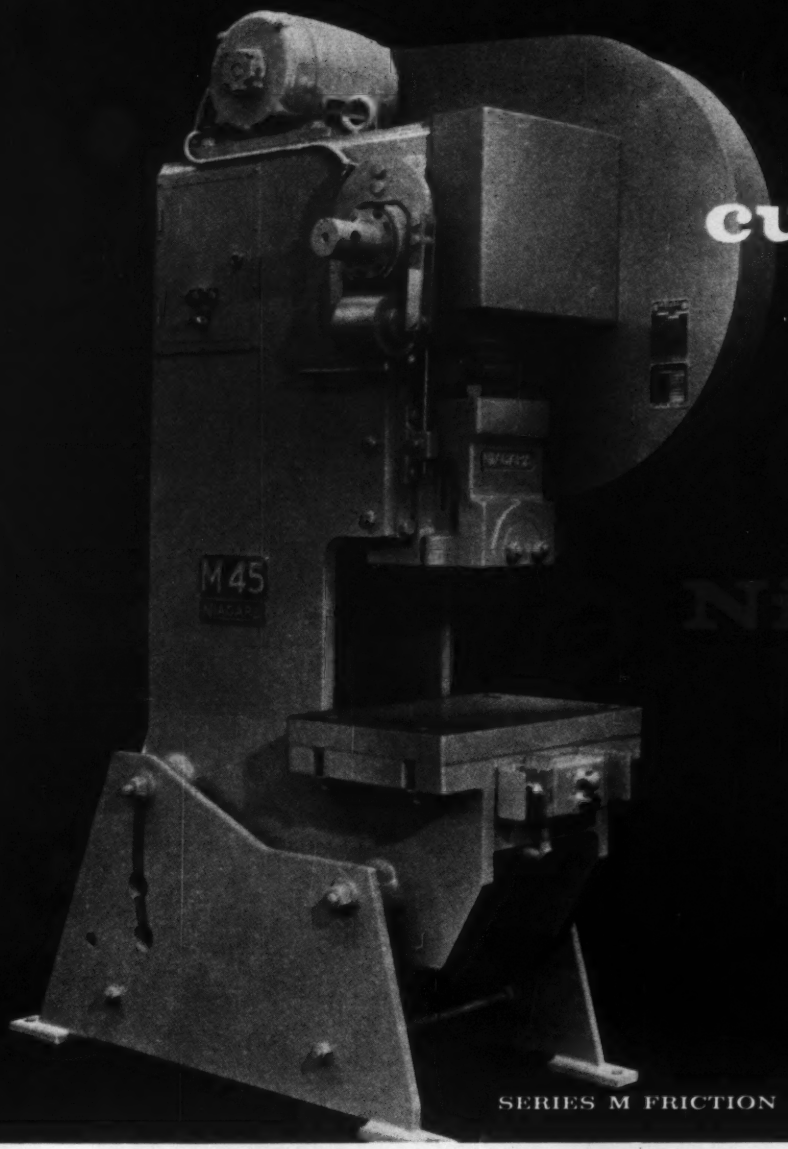
(Left) Roof-mounted hood and swivel-type duct connection collect fume from this 25-ton electric furnace during all phases of operation. Controls based on temperature automatically adjust rate of air flow in the system to the changing load.

(Below) Four-compartment Dracco Multi-Bag Filter handles up to 75,000 cfm at 225°F. All visible fume particles from three electric furnaces are collected by the unit's Dacron bags. Replacement of six filter bags is the only significant maintenance in four years of operation.



DRACCO *airstream* conveyors dust control equipment

FULLER COMPANY GENERAL



SERIES M FRICTION CLUTCH OBI

what customers like most about Niagara's new OBI line

Already in the field and on the job in substantial numbers, the new Series M is drawing a very significant response from production people. Here, briefly, are the features generating the most comment:

EXTRA RUGGED, NEW WELDED STEEL FRAME . . . surpasses in stiffness even the high standards by which Niagara OBI's have been known for years. Dramatically less vertical and angular deflection prolongs die life, assures uniformity of work.

FULLY ENCLOSED DRIVE . . . improves safety factor by eliminating exposed rotating parts. Front guard shields operator from oil splashes.

COMPACT BUILT-IN PRESS CONTROL . . . assembled with the latest in compact components. Nothing protrudes.

SLOW, LOW ENERGY, POWER-OFF JOGGING . . . When in "Jog" position, the Selector Switch *disconnects main motor*. Pressing 2 palm buttons (both hands) brings slide down slowly and smoothly. A separate motor jog button permits small shots of energy to be restored to flywheel as required. Die-setting is easier, faster, safer.

EXTRA LONG, RIGID SLIDE . . . prevents deflection of guiding ways. Exceptionally generous front-to-back mounting space, with mounting holes in front, rear, and sides, gives dies more solid support. New design provides for circulating oil and keeps oil out of die area.

Niagara Series M OBI Presses are available in 4 sizes (both non-geared and single geared) with shaft diameters from 2½" to 4" and capacities from 22 to 60 tons. A specialized design is built for automatic ultra high speed production. For the full story, send today for Bulletin 54. Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices and Distributors Everywhere.

NIAGARA

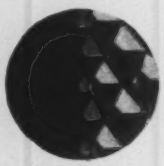
America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

BAY STATE MOUNTED WHEELS

set a new standard

Bay State has just completed a concentrated research and engineering program designed to make Bay State mounted wheels the finest available anywhere. Results are paying off for users in more uniform grinding action . . . easier operation . . . and virtually complete elimination of defective materials and workmanship. These wheels are as nearly perfect as the most advanced abrasive technology can make them.

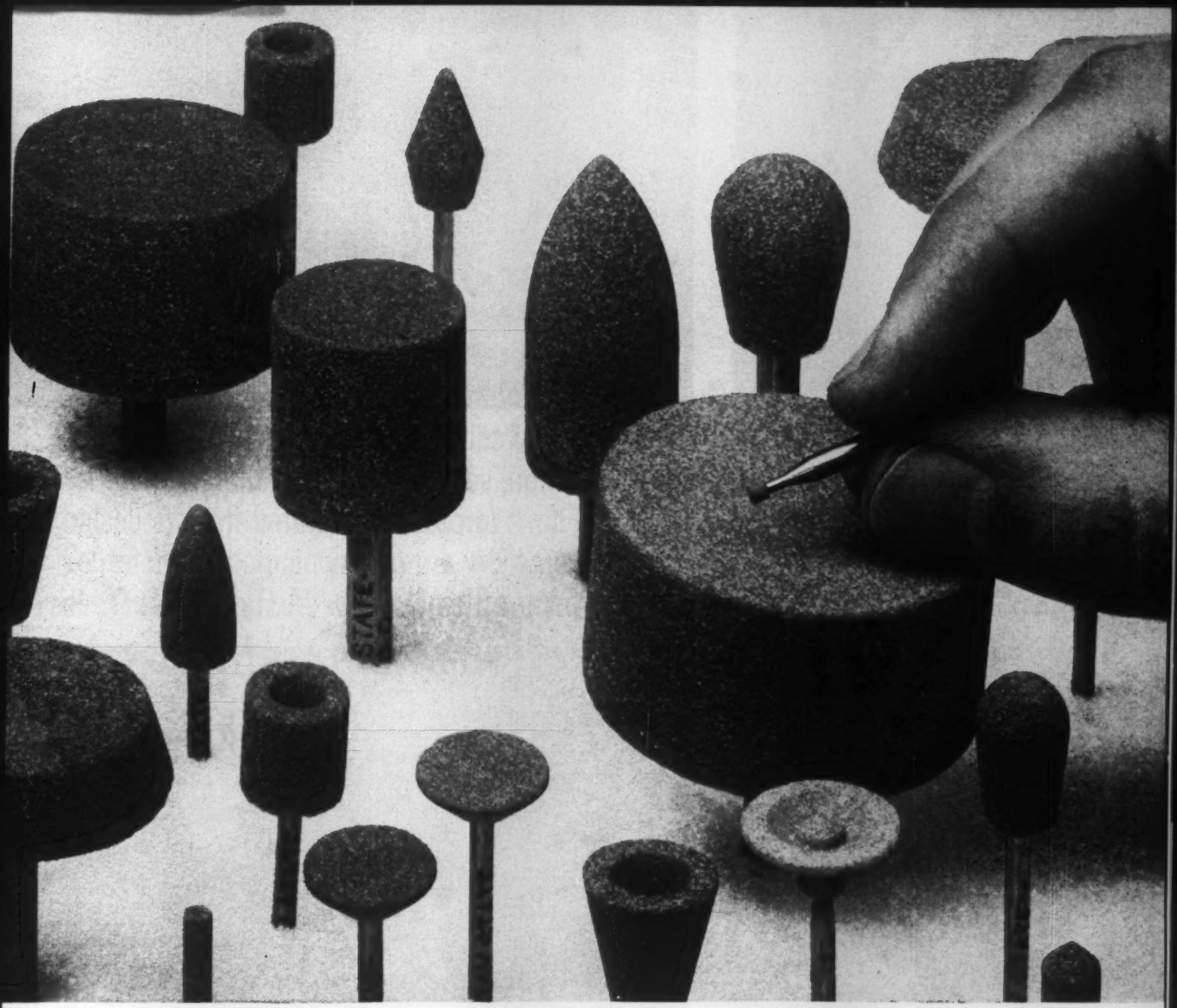
POSITIVE WHEEL-TO-MANDREL BOND Deeply knurled mandrel ends and specially formulated bonding material weld wheel and mandrel into a single, rock-solid unit. Constant, rigid quality control tests are made to check this Bay State feature.



SUPER-ACCURATE CONCENTRICITY Every wheel is molded oversize and then *ground to shape on its own mandrel* so that it *automatically* becomes perfectly symmetrical and is perfectly concentric with the center of the mandrel itself. *Result:* Every wheel runs true from start to finish . . . no breaking in required . . . no hard spots, no soft spots, the whole wheel does a 100% job of grinding right down to the mandrel.

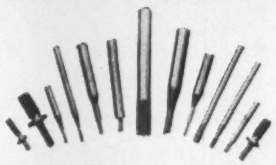
BAY STATE
WHEELS of PROGRESS

BAY STATE



# of excellence for the industry

MAXIMUM MANDREL UNIFORMITY Mandrel diameters are uniform to very close tolerances. No fumbling when operator changes wheels because new wheels can be locked into place with a minimum change in the collet or chuck setting.



COMPLETE INVENTORY IMMEDIATELY AVAILABLE Hundreds of different combinations of shape, grit, size, porosity, bond and mandrel size are in stock, ready to be shipped to users immediately. Bay State's 30-page catalog makes it simple to choose the specs you need for any job.

For special mounted wheels, call your Bay State, direct or distributor, representatives. They are abrasive specialists. *Better grinding at lower cost . . . that is their business.*

Bay State Abrasive Products Co.
Westboro, Mass.

Please send me the new Bay State Mounted Wheel catalog with full technical information on the best mounted wheels available to industry.

Company _____

Name _____

Address _____

City _____ *State* _____

ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.

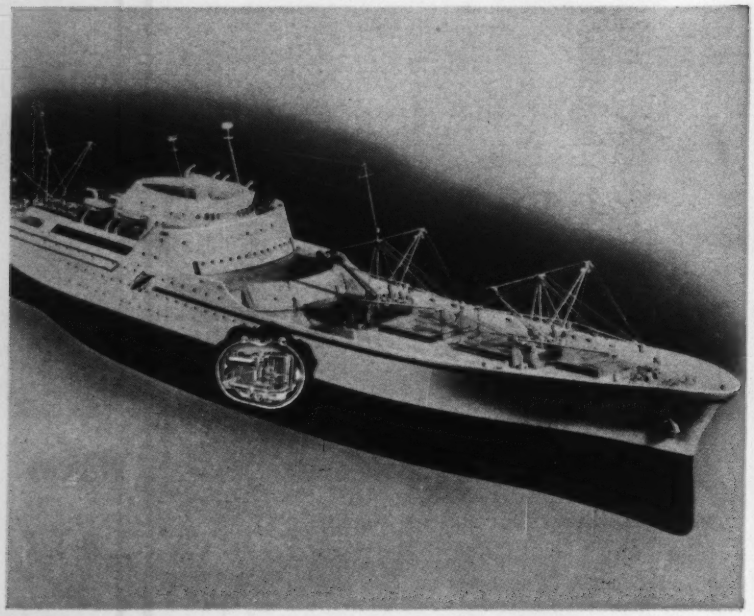
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.

Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

A company's reputation hangs on many things, including door hinges. This washer maker uses Stainless 430 Wire from Carpenter Webb Wire Division.

World's largest submarine, 447-foot, 5900-ton, atom-powered Triton, serves as early warning station for U.S. Navy task forces. Incorporated into its design for extra reliability are periscope mountings forged from Carpenter Stainless No. 4A (Type 304) Steel.

Family begs for eggs, thanks to this automatic skillet. Carpenter Low Expansion "42" Alloy in thermostat assures even temperatures...and tempers.



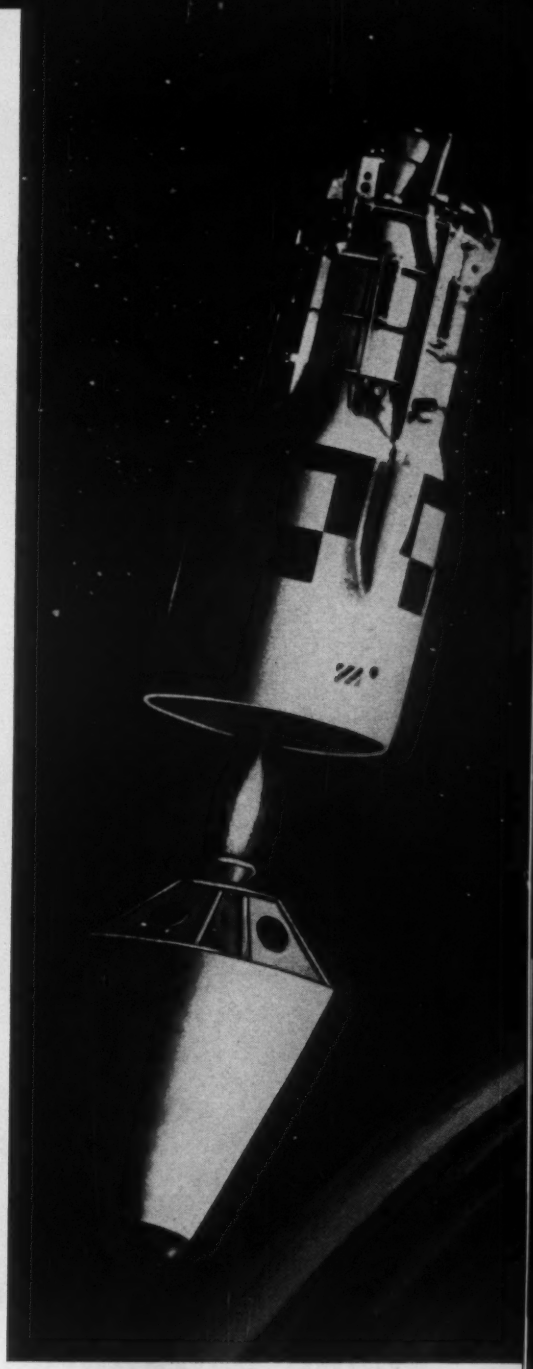
World's first nuclear-powered merchant ship, N.S. Savannah, will cruise for over 350,000 miles on one atomic fueling. The fuel assemblies for the Savannah power reactor contain 121 fuel rods clad in dependable Carpenter Type 304 Stainless Tubing.

you can do it consistently better with

The Carpenter Steel Company, Main Office and Mills, Reading, Pa. / Export Dept., Port Washington, N.Y.—"CARSTEELCO"

Everything adds up... to extra reliability in this famous-make bookkeeping machine. Contributing to its reliability are components shaped from Carpenter TGS Tool Steel. Again and again, wherever you find reliability a factor, Carpenter is first choice.

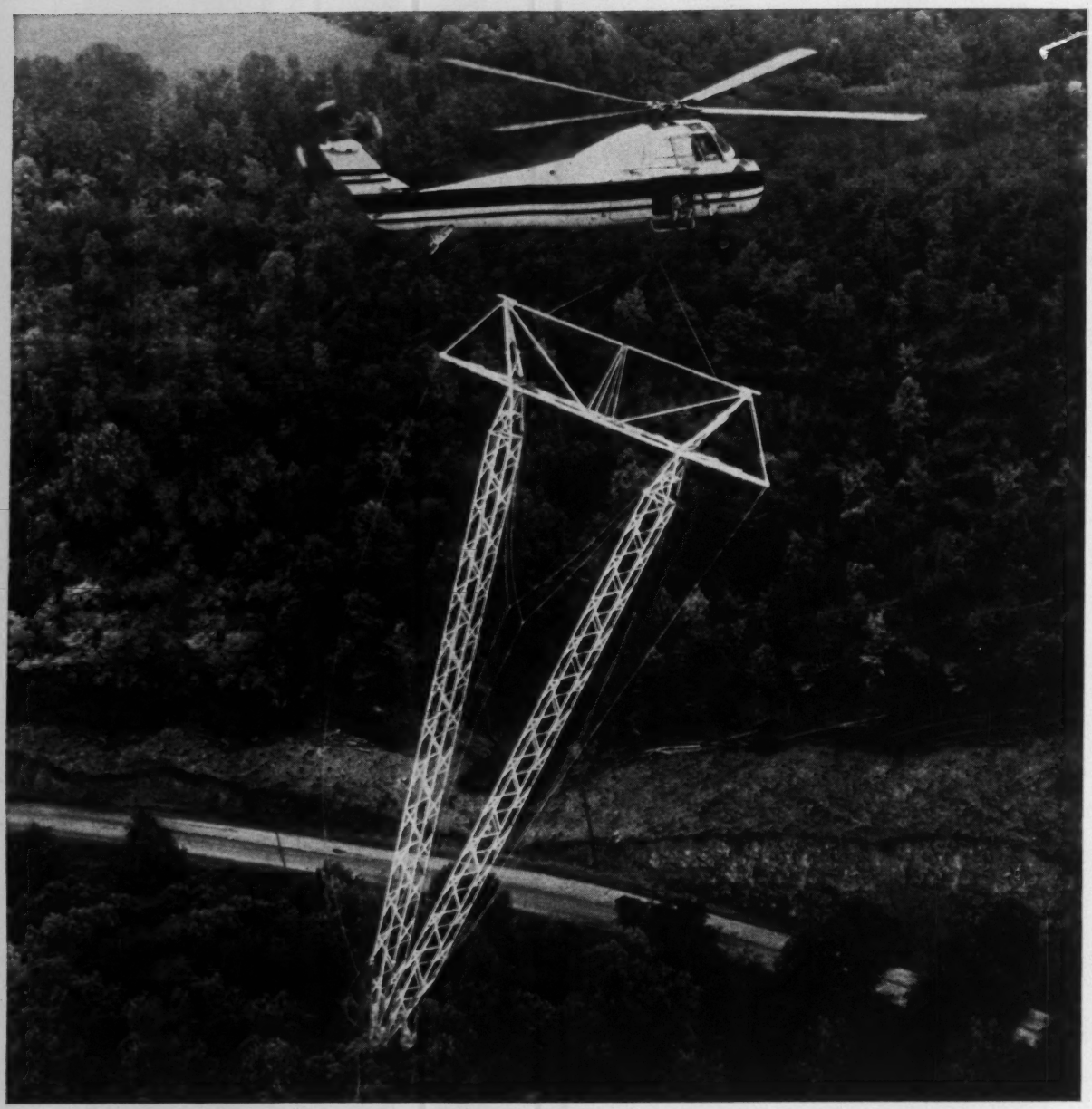
Research that profits you! From Carpenter's metallurgical laboratories come new tool steels to meet the demands of industry. Latest example: HI SHOCK 60 for applications involving extreme shock resistance. Now stocked for immediate deliveries.



Sets the pace in space! The "Discoverer" scores high on predictable performance. Used forgings of Carpenter High Temperature N-155 Alloy.

Carpenter Specialty Steels for Specialists

Alloy Tube Division, Union, N.J. / Webb Wire Division, New Brunswick, N.J. / Carpenter Steel of New England, Inc., Bridgeport, Conn.



Flying workhorse airlifts 80-foot power tower

Nickel in alloy steels gives 'copter transmissions extra strength for the toughest jobs

This Sikorsky S-58 is carrying a prefabricated tower to a power line construction project near Lynchburg, Virginia. After setting the towers in place, the 'copter saves time and money by helping to string wire from tower to tower.

Again, these flying workhorses prove they can handle the roughest assignments. But pilots don't want superlatives or guarantees. They want to know without doubt that critical parts will do their job. That's one big reason why nickel is alloyed into the S-58's transmission shafts and gears.

Nickel helps steel take the tremendous bending and twisting of a 'copter's drive shaft under powerful shock loads and unusual conditions.

Strength and toughness are only two properties that nickel imparts to alloys. It can help them withstand the intense heat generated by supersonic flight . . . or shrug off the intense cold of liquid helium. It also offers outstanding corrosion resistance.

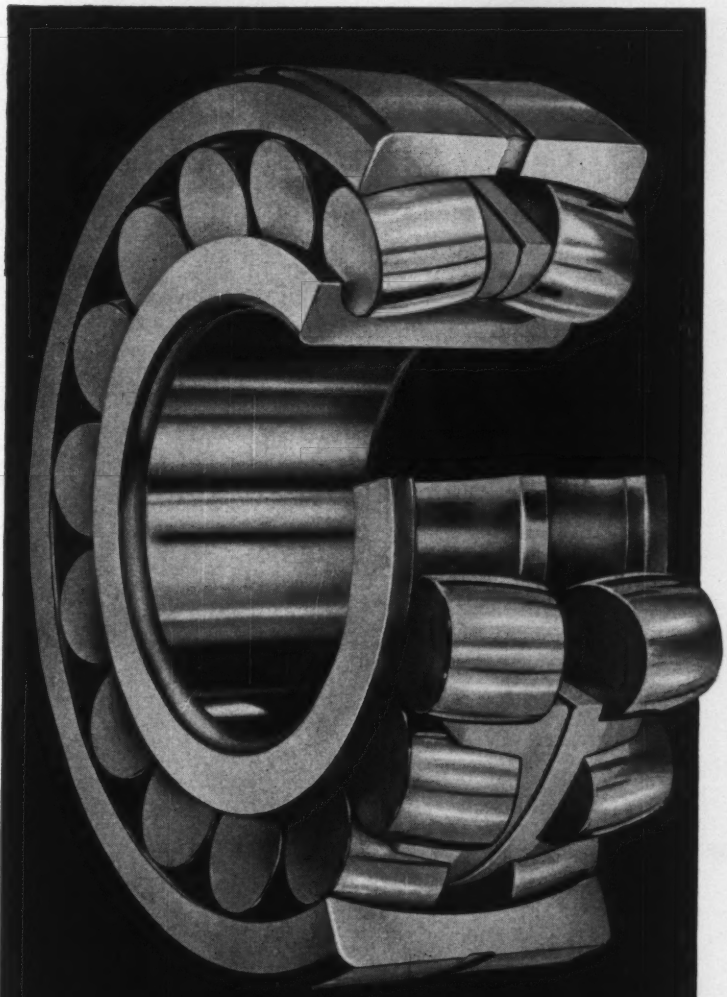
When you have a metal problem, don't hesitate to call us. Nickel or one of its alloys may provide the answer.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.

INCO NICKEL
NICKEL MAKES ALLOYS PERFORM BETTER LONGER

LINK-BELT SPHERICAL ROLLER BEARINGS:

measure these design values in terms of your applications



GREATER CAPACITY!

The reason? *More rollers, larger rollers!* Bearing capacity depends primarily on effective roller Length, roller Diameter and Number of rollers (L x D x N). And Link-Belt offers the *largest effective roller complement* for all sizes of spherical roller bearings . . . rated according to accepted formulas of the Anti-Friction Bearing Manufacturers Association. This increase in LDN values provides extremely high capacity . . . and in users' evaluation, it adds up to far longer bearing life.

GREATER DURABILITY!

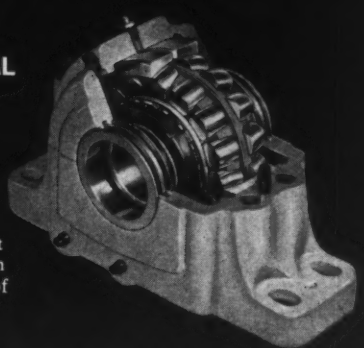
With balanced proportion design, Link-Belt spherical roller bearings possess durability characteristics that exceed the bearing industry's exacting requirements. Optimum balance of rollers, inner and outer rings must be obtained for increased bearing capacity . . . yet overall bearing dimensions must conform to an established international standard boundary plan.

Wrap-around, completely contoured retainers also contribute to durability through positive roller guidance and spacing. Precision-machined of centrifugally cast bronze, these husky retainers are far stronger than stampings or sand castings.

GREATER PRECISION!

Link-Belt spherical roller bearings are made in the world's most modern bearing plant . . . with the most-advanced tools and techniques known to industry. A rigid quality control program leaves *nothing* to chance. Each Link-Belt bearing is subjected to *758 actual inspections*. Microsmoothness and precision are continuously scrutinized by automatic machines. Result: these bearings have been specified by leading manufacturers of cranes, shovels, graders, vibrating screens, and steel mill, paper mill and foundry equipment . . . and for high-precision applications such as embossing rolls, printing presses and torque converters.

SEE BOOK 2760 for further precision, durability and high-capacity features. Contact your nearest Link-Belt office or authorized stock-carrying distributor. Look under BEARINGS in the Yellow Pages of your phone book.



LINK-BELT SPHERICAL ROLLER BEARING PILLOW BLOCKS

Made with sturdy gray iron or super-rugged cast-steel housings. Adapter mounting types for shafts from 1 7/16" to 10 1/2" and direct-shaft mounting types for shafts from 1.7717" to 11.0236". Choice of rugged steel, multi-labyrinth or Dacron-contact seals.

LINK-BELT

SELF-ALIGNING BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,691

Call Crucible for steel service in depth

The inside account salesman — backed by a computer-controlled inventory system — offers the widest range of special steels and services.

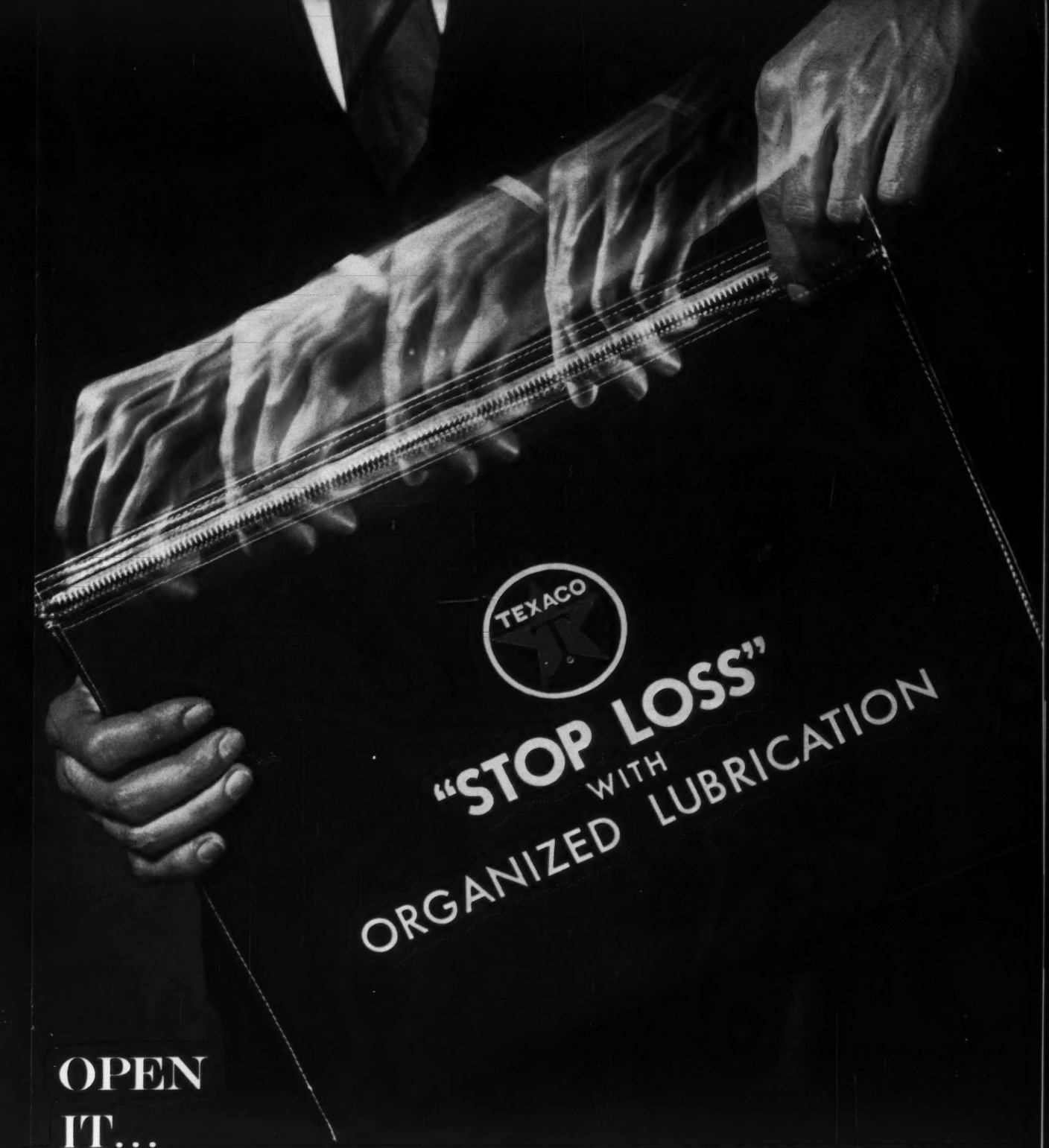
He himself can locate the steels you need within minutes—whether they're at his own center or at any other Crucible steel center or mill. He's backed by an electronic communications network and the most extensive inventory control system in the business.

The local Crucible steel center makes available versatile shop experience with all forms of metal-working, too. The inside salesmen are "walking data books" on alloy steels, tool steels, stainless. Right beside them are Crucible sales-service engineers and regional customer technical service engineers whose specialties include metallurgy, chemical engineering, welding.

Behind these men are other specialists: inventory controllers, draftsmen, saw men, warehousemen, teletype operators. Their skills combined make buying specialty steels a simple, economical matter. For a rundown of all the services available, call the local Crucible steel center and ask for an inside salesman. Or write: *Crucible Steel Company of America, Four Gateway Center, P. O. Box 88, Pittsburgh 30, Pa.*

CALL CRUCIBLE
— and ask to have your name added to the mailing list to receive local stock lists.

CRUCIBLE STEEL COMPANY OF AMERICA

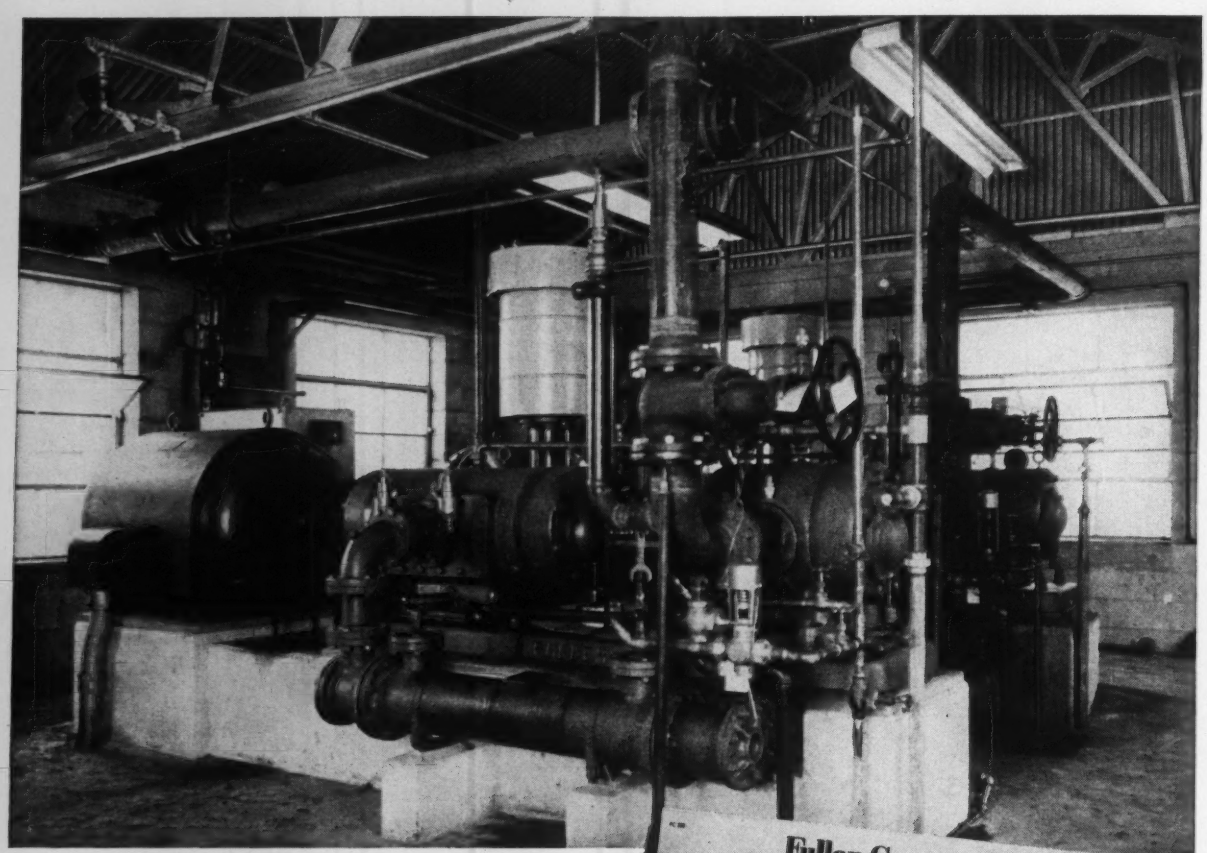


OPEN IT...

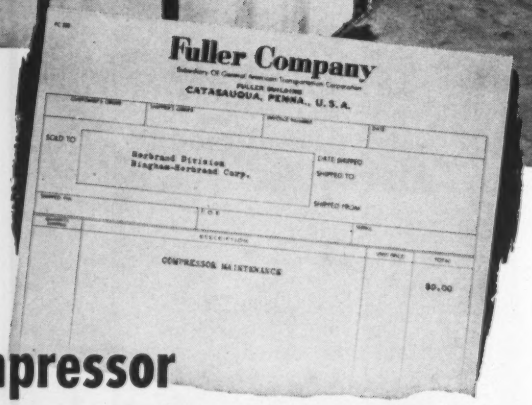
FOR UP TO 4% EXTRA NET PROFIT

In the Texaco man's briefcase is a plan for cost control through organized lubrication—Texaco's "Stop Loss" Program. Management in many different industries is already using it to cut operating costs. The resulting savings go directly into profits. Up 4% is the average. To find out how you can turn excessive costs into profit, write for our informative folder: "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. IA-201

TEXACO



Two C135/135H Fuller Rotary Compressors at the Herbrand Division of the Bingham-Herbrand Corp., Fremont, Ohio, leading manufacturer of forged mechanics' hand tools and steel forgings for the automotive industry. Each compressor is rated 680 cfm, atmosphere to 100/110 psig., at 690 RPM.



Here's the 4-Year Maintenance Bill on Fuller Rotary Compressor at Herbrand Division of Bingham-Herbrand Corp.

So satisfactory was the performance of its first Fuller Rotary Compressor, installed in 1956, that Herbrand Division installed another like it 3½ years later.

When the older unit was inspected after four years operation, no replacement of parts was necessary. After installation of a new gasket (cost $9.35)—to replace the one that had to be removed to make inspection—the compressor continues to add to its service record.

The newer compressor has also been entirely trouble-free, and Herbrand plans a third, when increased air capacity is required. It, too, will be a Fuller—for, as Herbrand says, "These compressors can be classified as maintenance-free."

Because Fuller Rotary Compressors are practically vibration-free, they can be installed without complicated or expensive foundations or structural modifications. They are simple and efficient, with no valves to leak, no seats to grind. Blades automatically compensate for wear. They have forced-feed lubrication to all parts within the cylinder. Rotor, bearings and blades are the only moving parts.

Fuller Compressors range from 30 to 3300 cfm, pressures to 125-lb. gauge.

Write for Bulletin C-5A. It tells the whole story.

See Chemical Engineering Catalog for further details and specifications.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

2852
C-364

Charles Saenger, Chief Metallurgist for the Illinois Tool Works in Chicago, Illinois.

CHARLES SAENGER tells how Lindberg equipment produced better cutters and hobs

QUOTE

"Unground form cutters and hobs require certain refinements above and beyond those needed for ground tools. Our Lindberg-Upton salt-bath units and daily chemical control of the salt-bath solutions help us maintain an excellent surface condition and hold to critical dimensional tolerances and close hardness range required by these tools. We are very well pleased with the consistent, trouble-free service our Lindberg-Upton furnaces have provided month in and month out."

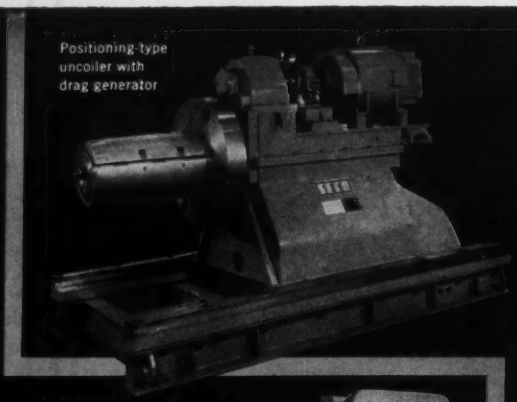
The success of Illinois Tool Works in producing their top-quality unground form cutters and gear hobs is a well-established fact. The banks of Lindberg-Upton furnaces in their plant provide quality control in high speed steel hardening through the ability to hold rigidly the desired temperature and also assure proper salt conditions at all times.

The solution to any salt-bath furnace requirement is easy to find. Just look to Lindberg, and the complete line of Lindberg-Upton high and low temperature furnaces for every production process where salt-bath equipment is needed. For complete information just call the nearest Lindberg representative (he's listed in your classified phone book) or, if you prefer, write us direct. Salt Bath Furnace Division, Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, Spain, Switzerland and West Germany.

LINDBERG
heat for industry

One of the Lindberg-Upton Salt Bath Furnaces at Illinois Tool Works



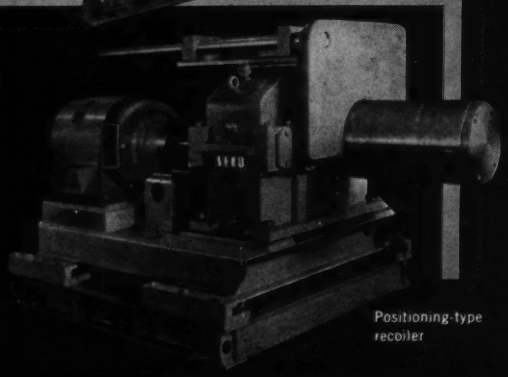
Positioning-type uncoiler with drag generator

Predictable Performance

for processing lines with

SECO

terminal equipment



Positioning-type recoiler

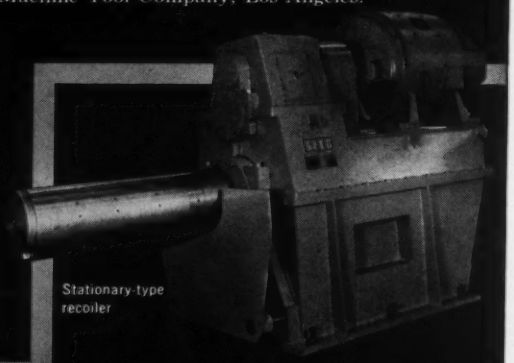
From entry to exit, new and modernized processing lines . . . annealing, pickling and others . . . perform better with SECO terminal equipment. This equipment handles coils ranging from 10,000 to 50,000 pounds with speed, convenience, safety.

SECO uncoilers and recoilers are designed to operate at any speed the mill requires, are available in positioning or stationary types. The positioning types feature a slideable reel base mounted on a sub-base for alignment with the processing line, actuated by an automatic edge control.

SECO also makes auxiliary equipment such as coil cars with coil lifts to simplify uncoiler loading and recoiler unloading. Available for mandrel or cone-type reels.

A staff of trained sales engineers will assist you in finding the equipment best suited to your needs. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles.

Stationary cone-type uncoiler



Stationary-type recoiler

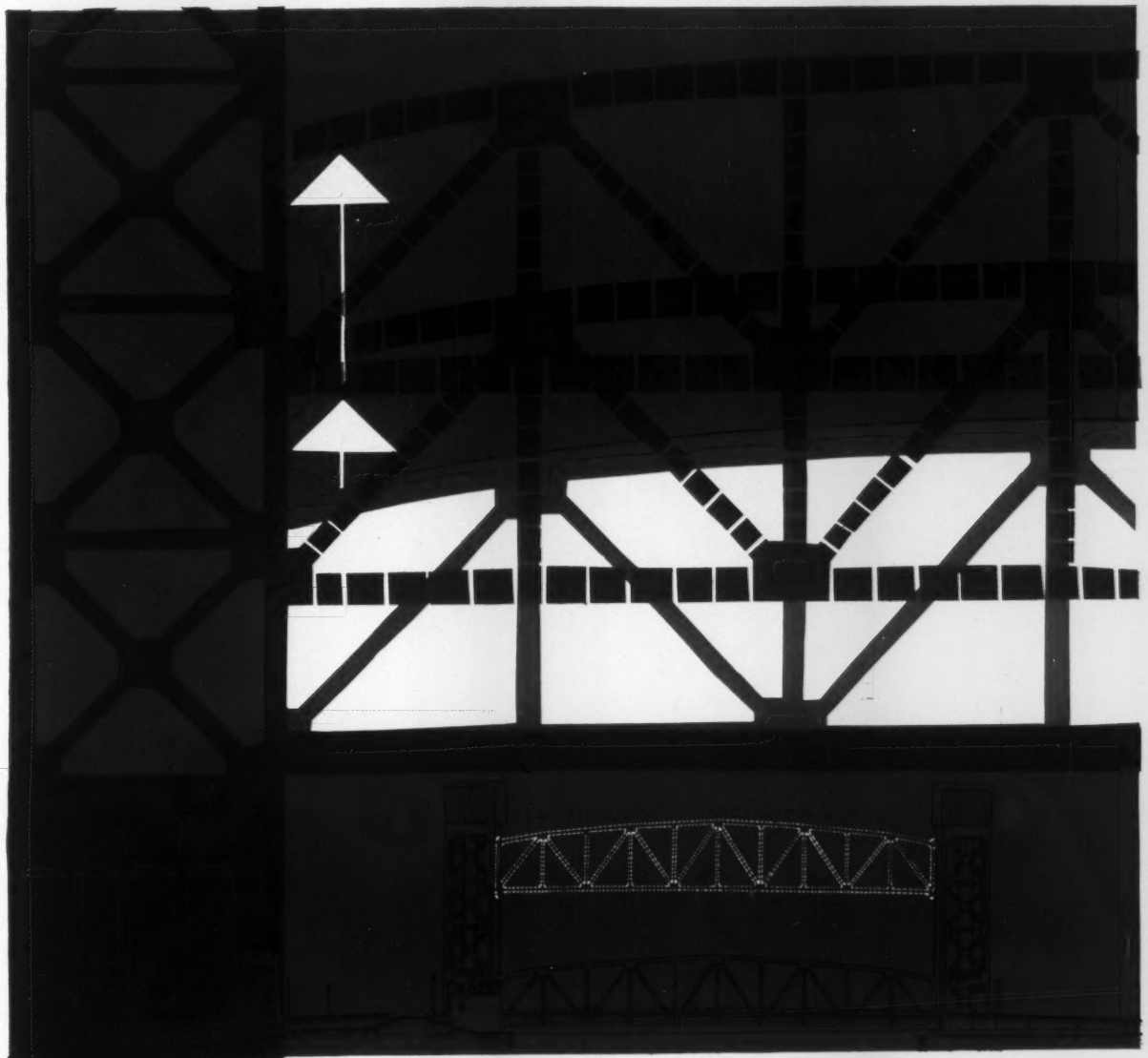
SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

Affiliated with Lee Wilson Engineering Co., Inc.



OHIO STREET LIFT BRIDGE, BUFFALO, NEW YORK

fabricated by

the

LEVINSON STEEL COMPANY

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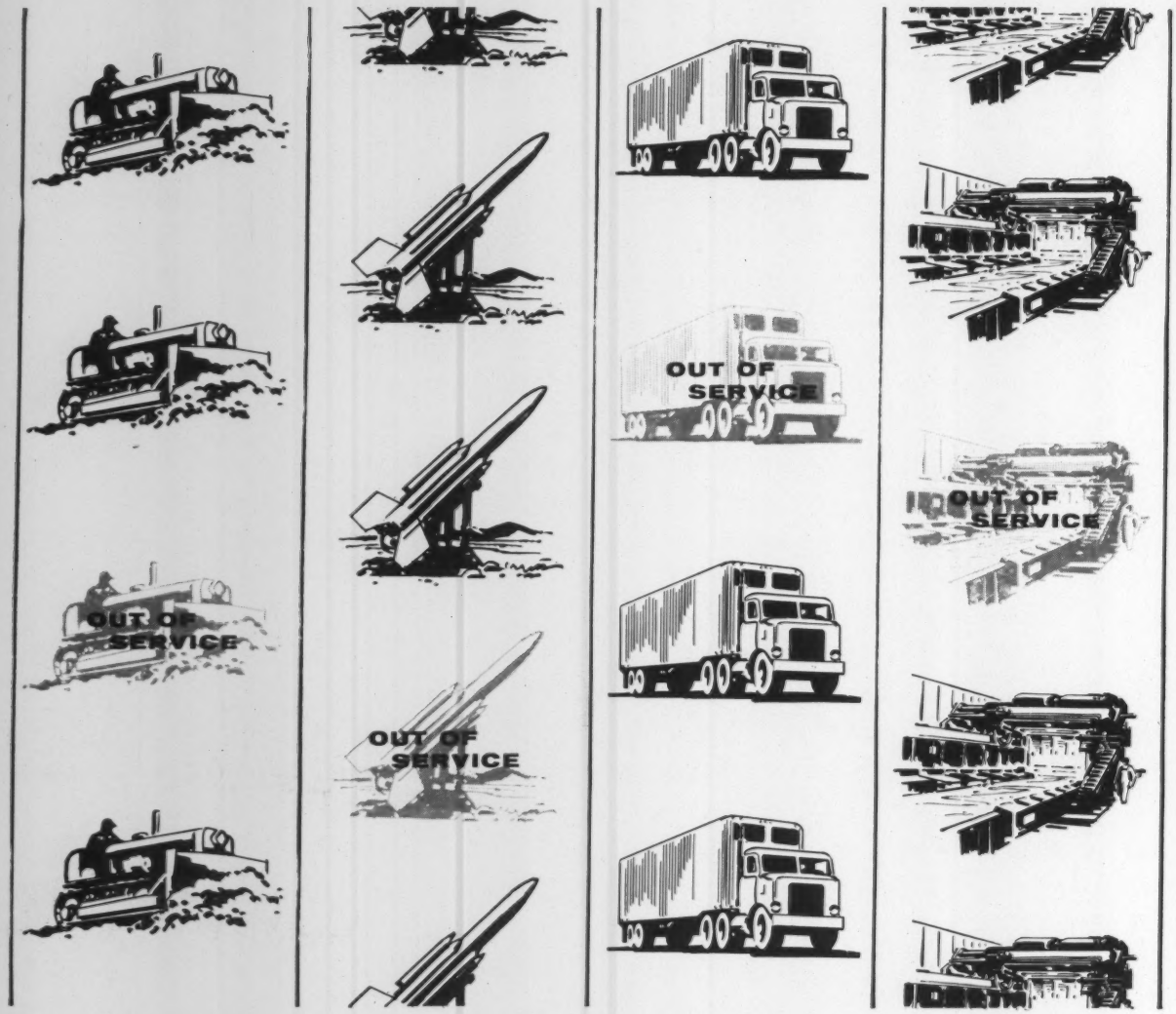

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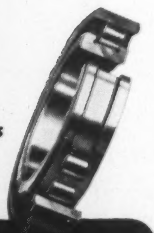

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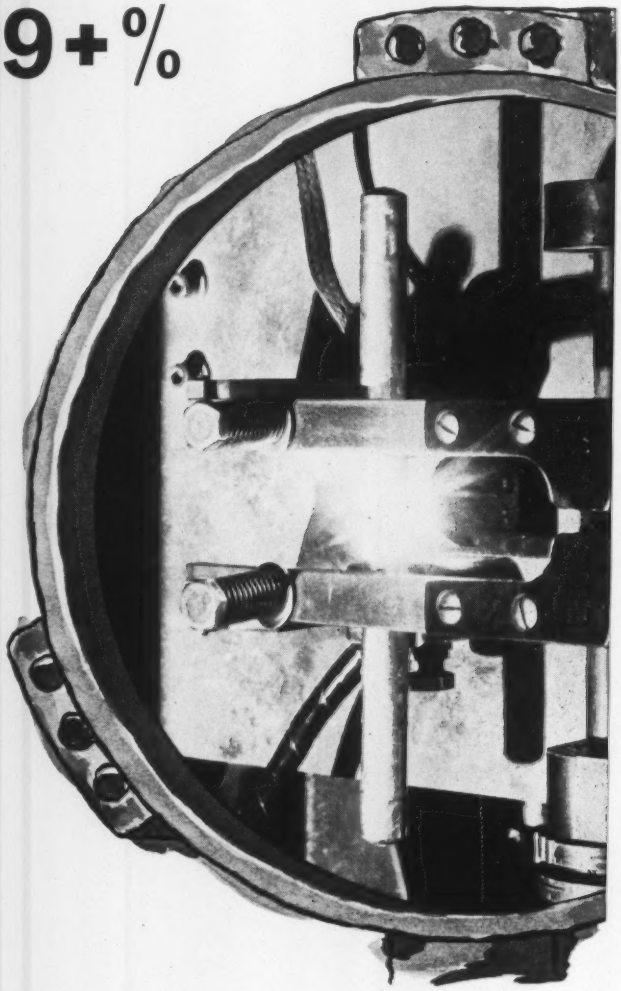

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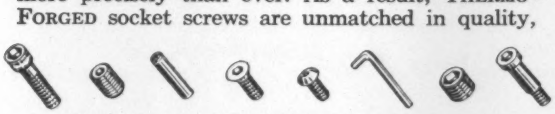
Are inspection, in-warranty and replacement costs putting a tight squeeze on your profits? Join other profit-conscious industrial leaders in turning to *quality* to reduce these costs and increase profits. THERMO-FORGED socket screws are produced by a patented electronic forging process which pre-conditions the metal. This makes possible exact control of metal flow, and allows us to maintain tolerances impossible with other forging methods. Thread rolling and subsequent operations are controlled more precisely than ever. As a result, THERMO-FORGED socket screws are unmatched in quality, free from flaws, checks and hidden imperfections, with dimensional precision unattainable with ordinary forging methods. THERMO-FORGED socket screws can materially increase your profits by reducing rejects and in-warranty service costs. See your authorized Holo-Krome distributor or write for more information.



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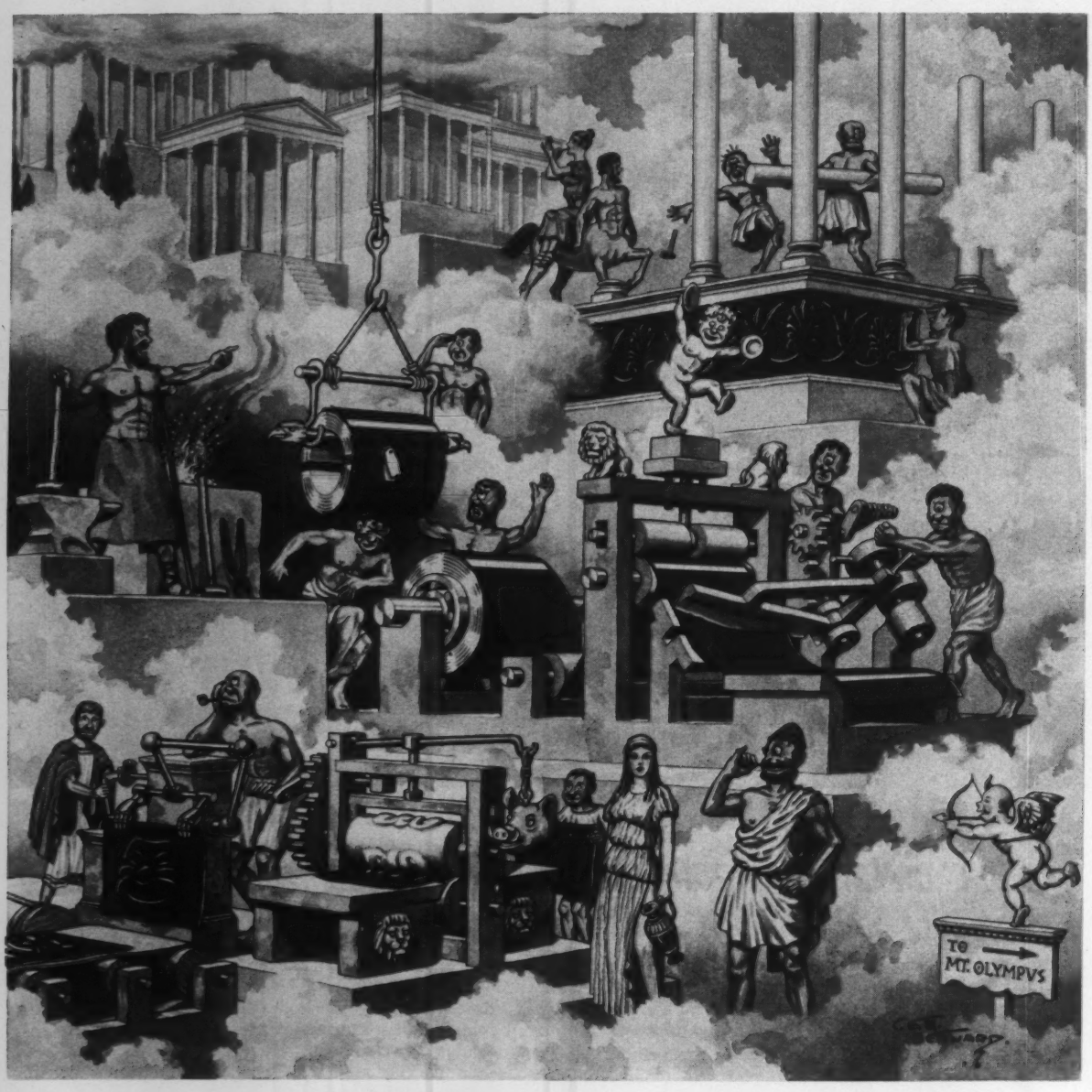
Venus, obviously, had more than love in mind when she importuned Vulcan to accompany her back to Mt. Olympus and set himself up as the architect of that heavenly realm.

Vulcan, the first metallurgist, knew the rarified air and the cosmic disturbances of the upper regions made a shambles of ordinary building metals. Upon arriving with his corps of Cyclopes, one of his first official acts was to put in a supply of Washington Steel's ColorRold stainless and proceed to erect a permanent haven for his mythological playmates.



There is no substitute for stainless steel whether you are building a skyscraper, a space vehicle or a kitchen sink. Washington Steel's ColorRold stainless enables you to enhance the beauty of your quality product. *It's a better product if it's made of stainless steel.*

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WASHINGTON, PA.

SALES HEADQUARTERS OF COMPANIES should be located in large cities. This is the view of J. J. Studley, head of a $20 million per year real estate leasing company. Says Mr. Studley: "Sales executives should not be isolated." But he says manufacturing operations should avoid cities. Sales headquarters, he says, are "really a part of a company's sales pitch."

BARGAIN PRICES FOR SEMICONDUCTORS will boost their sales for use in the consumer and industrial markets in the next two years. This is the forecast of the General Electric Corp. The company points out that more than 80 companies were making semiconductors in 1960, compared with 45 in 1958. At the same time, prices for these products fell between 40 and 65 pct.

"BUY AMERICAN" POLICY is continuing to weaken as a guide to domestic purchasing men. In one recent case, the New York Transit Authority awarded a lead cable contract to a Canadian company after receiving identical bids from U.S. companies. The TA says it is "reconsidering" its Buy American policy.

NEW HOUSING may not get the spur from lower FHA interest rates that had been widely expected. Based on May figures, less than 2 pct of the new homes being built in 1961 will be financed with FHA-insured mortgages.

PURCHASING AGENTS, in the May business survey of the National Assn. of Purchasing Agents, report inventories are finally being accumulated. But they are still cautious. And they report lengthening of vendor delivery times. Also noted: Price increases in "more evidence."

GRAY IRON FOUNDRIES reported operations at 71 pct of "ideal" capacity in May. This is an 11 pct jump over the April level. The 188 reporting foundries shipped 88,458 tons in May. On the shipping outlook for June, 97 founders think June will be the same as for May. Sixty-two think it will be up; 29 see a downtrend.

A BIG AUTOMOTIVE SUPPLY switch was made last week. Champion Spark Plug Co. replaced Electric Autolite Co. as an exclusive supplier of sparkplugs for Chrysler Corp. in the U.S. Champion's long business alliance with Ford Motor Co. was recently severed when Ford bought Autolite's sparkplug facilities. The new contract covers Chrysler car, truck, marine and industrial needs.

in New York City...

Cleveland Worm Gear Speed Reducers help provide trouble-free air conditioning for Rockefeller Center's New Time & Life Building

Playing an important role and forming an integral part of this 48-story building's all-important cooling system are 21 type CU Cleveland Worm Gear Speed Reducers designed especially for high-speed, heavy duty continuous service under extreme conditions of both heat and humidity.

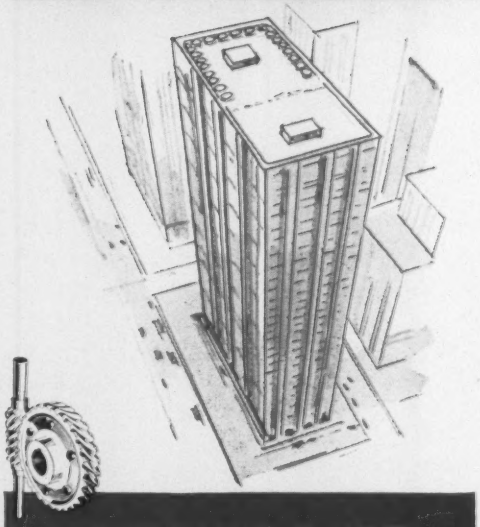
As related by Mr. Charles A. Fenster, president of Phillips Cooling Tower Company, Inc., Brooklyn, New York, "These Cleveland Drives—installed between the cooling tower fans and their electrical drive motors—will give many years of trouble-free service even though this type installation is the *most severe* to which speed reducers can be subjected.

"Because we can provide no solid vibration-free concrete base for mounting the reducer, some movement will always exist. Thus, the Cleveland Drive's design and construction is put to the fullest test. Only a quality product could possibly provide the long service life we know the Clevelands will give us.

"We've used Clevelands over a period of 22 years for two reasons: They provide us the best quality product in the greatest number of ratios. And, they're generally regarded by users as the best cooling tower drives available anywhere—give the greatest service life."

Inherently quiet operation of Cleveland type CU Drives make them ideal for air conditioning public buildings, theatres and department stores. In addition, they have gained wide spread acceptance for industrial applications such as driving induced draft fans in catalytic cracking plants and public utilities where large volumes of process water must be cooled.

Why not specify these versatile Cleveland Drives for your most demanding applications. A more complete story of these rugged CU units is contained in free, fully illustrated Bulletin 135-S. Write for your personal copy, today.



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Future Shortage of Engineers Starts on Campuses Now

Engineering enrollments in U. S. colleges have fallen by more than 14 pct since 1957. But industry's need for engineers rises steadily.

Full impact of problem is yet to be felt. Experts urge immediate action by companies.
By J. D. Baxter

■ Since 1957, fewer and fewer freshman have been signing up for engineering courses in the nation's colleges. And on top of this, almost a third of those who do start engineering courses don't make it through to the second year.

While the number signing for engineering has shown actual declines only since 1957, relative interest in engineering has been on the decline for a decade. In 1951, freshmen in engineering made up 8.4 pct of all new enrollments. In 1960, 7.3 pct.

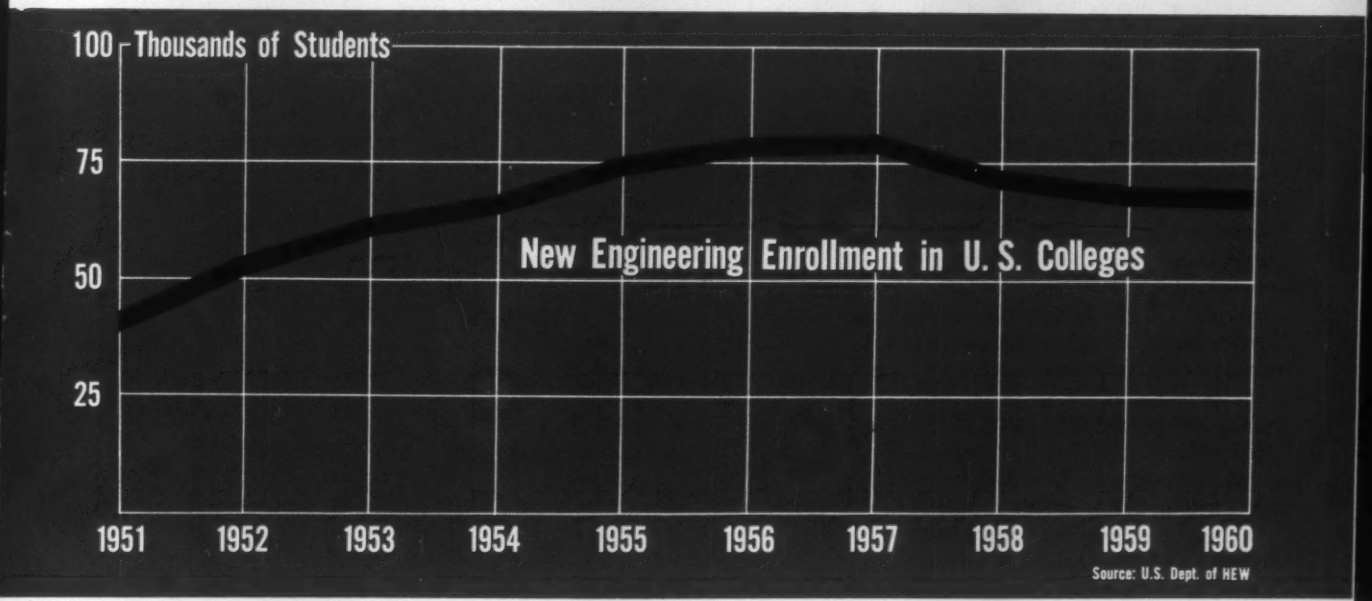
But the demand for engineers in both industry and government rises steadily. Says a spokesman for the National Society of Professional Engineers: "In the past decade, engineering employment demand has risen sharply and steadily. Yearly jumps in employment have averaged between 3 and 8 pct."

Salaries Up—The threat of a coming shortage of engineers poses a real problem for industry. Already, near-frantic recruiting of engineers on college campuses has sent starting salaries up to $600 or more per month. And the annual median salary for U. S. engineers has jumped from $6500 in 1953 to $9600 in 1960. This is a jump of about 49 pct in seven years. It compares to a rise of 27 pct in the average weekly wages of production workers over this period.

And a number of large engineering conferences and meetings have been termed "slave markets." Here, in almost bazaar-like trappings, "body-hunters" and job-seekers get together to hire new men and to make new connections. One top source estimates engineer turnover already costs at over $300 million per year.

Metalworking industries are in the front ranks facing this engineer supply problem. They are among the largest employers of the na-

Engineering Enrollments in Decline Since 1957



tion's estimated 615,000 working engineers.

Big Employers—The aircraft and parts industry is the largest employer with an estimated 83,000 engineers. Electrical equipment makers employ 81,000, and non-electrical machinery producers, about 62,000. Fabricators of metal products employ 32,000 engineers. And the primary metal industries employ 23,000.

Industry has not yet faced the full impact of an engineer shortage. This is because past college engineering enrollments were at a higher volume level than present classes. More have graduated lately than have enrolled.

Enrollments, not degrees, tell the story of the future. Here is the freshman engineering enrollment record since 1957.

In 1957, 78,757 signed up for degree-credit work in engineering. In 1958, 70,029 enrolled, a drop of 11.1 pct. In 1959, 67,704 enrolled, a drop of 3.3 pct from the previous year. And in 1960, 67,556 enrolled, a drop of 0.2 pct.

Drop-Outs Climb — Some observers see a hopeful sign in the lessening of the decline rate. But more are concerned over the low retention rate of those who start engineering courses. In 1951, 78 pct of freshman engineering students made it into the sophomore year. In 1959, a steady drop in retention carried this down to 68.5 pct. Only about 40 pct of those who enroll in engineering ever earn degrees in this field of study.

A recent study by the U. S. Office of Education calls this falling retention rate a "significant trend."

There is no agreed-on cause for the decline in engineering enrollments. This makes a cure difficult at best. Enrollments may reverse the trend this fall but there will still be no assurance that a permanent solution has been found for the problem.

Last year, the Engineers Joint Council asked 150 deans of engineering colleges (out of 231 U. S. colleges offering degree-credit engineering courses) for their views on the causes of enrollment declines. The EJC is a central coordinating body of most of the leading national engineering societies.

Deans Speak Up—Three chief reasons were cited by the deans.

They felt that young people were being lured into other fields of science by the space-age glamor attached to these fields.

They felt that high school graduates were fearful of the rigors and demands of college engineering courses.

And, lastly, the deans felt there was a "decrease in applications from students who were really not interested or motivated towards the engineering field." This refers to a lack of public stimuli drawing students into engineering, such as a war or new GI Bills.

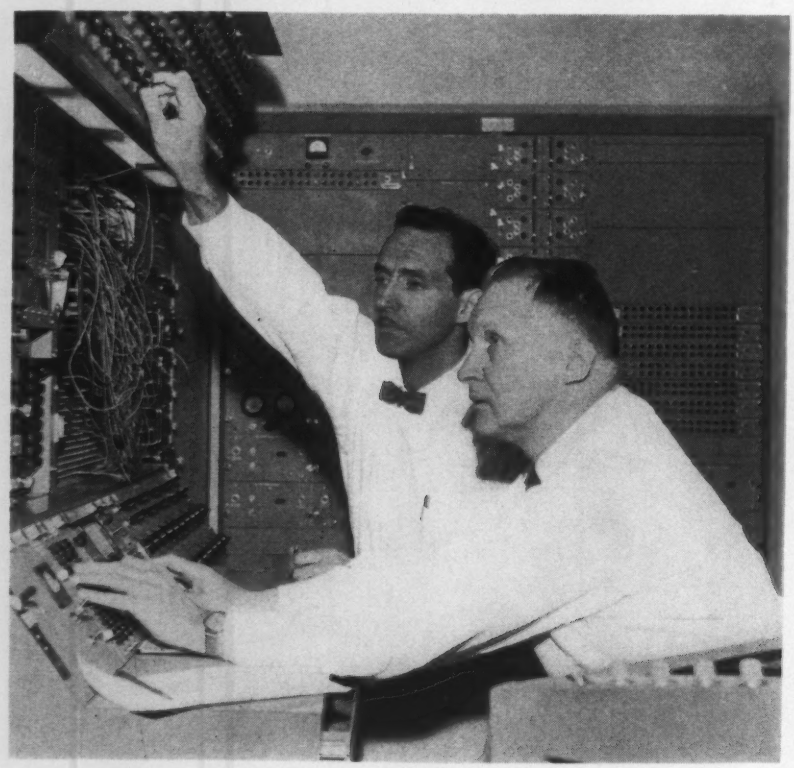
College-Engineering Teamwork In Action

The DuPont Co. is one company working hard on the problem of more and better engineers. One approach used by the company is called, "Year-in-Industry" program. Every year, one or two top college engineering teachers or administrators are put on the company payroll for a first-hand, 12-month exposure to engineering problems and practices in industry.

Many college deans report strengthening of their engineering curricula through the "messages" brought back to campuses by these men.

Here, Dr. R. J. Altpeter, right, professor of chemical engineering at the U. of Wisconsin, and a current participant, works on a computer with DuPont engineer, R. G. E. Franks.

Dr. Altpeter says he is looking for the "basic trends in the industry and how best our engineering curricula meets the needs of the future."



But the first two reasons cited by the deans have little support in cold figures. For example, only about 6752 more students started on courses in science in 1959 than in 1957. If these increased enrollments had gone into engineering rather than science classes, then engineering classes would still be under their levels of 1956-57.

"Tougher" Courses—And it is not likely that students who are scared away from "tough" engineering courses are eager to plunge into even tougher science courses. It is widely believed that the mathematics content is what scares students from engineering courses. Yet, math enrollments (3rd year), have had a spectacular 54 pct jump in the 1957-59 period of declining engineering enrollments.

A number of college engineering deans point a finger at lower standards in secondary school education as the cause of falling enrollments and retention rates in engineering courses.

Says one dean: "High school courses are watered-down versions of real courses and stress the glamor of the type of 'science' that appears in the daily press."

Others are critical of both secondary and college course technical content and treatment. Dr. Ernst Weber, president of Polytechnic Institute of Brooklyn, suggests a "streamlining and modernization" of present courses to make them more appealing to prospective students.

Teaching Hit — Some blame teachers, not systems. "Today," says one educator, "it is impossible to judge an engineering candidate by his high school grades because the teachers are not pressing their students."

Still others blame the times and the softening effect on young people. "We are getting students," says one college educator, "who do not know how to work and do not want to work. As a product of our times, our students have been spoiled."

Dr. S. Reid Warren, assistant vice president of Engineering Colleges at the University of Pennsylvania, has long studied the problem of engineering enrollment decline. His comment is typical of several other analysts. "The truth is," he says, "no one really knows the reasons. We are all trying hard to find them. We have only our feelings and our impressions."

Depth Study Needed — It all points up to this: The air is rife with speculation. This is due to the absence of any definitive study into the cause of decline in engineering enrollments. What studies have been done are either data-gathering or opinion-polling, not analytical approaches to causes and effects.

And this situation boils down to a matter of money. Probably, the number one research body on engineering education is the Engineering Manpower Commission of EJC. The commission depends entirely on contributions from industry to carry on its work. These contributions, of late, have reflected the recessions of 1958 and 1960. It has lacked the funds to launch a definitive depth study into the causes and cures of engineering enrollment declines.

What is needed, Carl Frey, staff head of the commission, told The IRON AGE, is a coordinated attack on the problem by industry, engineering groups, and educators. There must be hard analytical digging into what motivates high school students in selecting courses.

Unity Needed—"So far, much effort has been fragmented," says Mr. Frey. Companies, colleges, trade groups and communities have been hitting the problem as they are affected by it, and with the means at their disposal.

Industry, the experts say, faces both a short-term and long-term challenge in meeting a possible engineer shortage.

The long-range problem implies more than an industry problem. The problem is a national one. The Russians, for one, are producing more—and as well-qualified—engineers than the U. S. (see box).

Act Now—And Mr. Frey puts the short-term challenge in perspective. "Industry may become aware of the engineer shortage too late," he says. "There is no present panic situation. But two to three years from now, the fall-off in engineering enrollments will show up in much smaller graduating classes. And present estimates point to an even greater demand for engineers than today."

Mr. Frey joins other experts in urging companies to take a hard look at their existing engineering forces and determine ways to "utilize them more fully."

How U.S. Compares With Russia

Last year, a delegation from the Engineers Joint Council toured Russia. Purpose: To study utilization of engineers and technicians; how they are educated and integrated into the Soviet economy. A digest of findings:

Quantity

	Russia	U. S.
Engineering Graduates in 1960	108,000	38,000
Technician Graduates	200,000	15,000

Quality

"The theoretical and mathematical content of Soviet engineering education is above that generally given in the bachelor programs in U. S. engineering colleges."

"Of the annual graduates of U. S. technician schools (15,000), not over 1,000 are of the quality of those produced by the Soviet Union (200,000.)

What's Next for Steel Prices?

Will price cuts for a few specific products spread to big tonnage products?

In some ways, the present price situation parallels that of the late 1930's when the price structure fell apart.
By Tom Campbell

■ The mechanics of the steel price cutting may be complex. But the reason for the recent shadings is quite simple. It is nothing more than supply and demand.

The current wave of price weakness has not yet officially affected the so-called base prices — except for a few specific items. But that is little comfort to those who have been trying to get more, not less, for their steel.

The concessions — on stainless prices, oil country goods, line pipe, concrete reinforcing bars and wire rope—spell a price cut no matter how you slice it.

Reasons why—It is all a reflection of increased capacity, the entrance of many small electric steel producers into the business in the past ten years, the impractical aspect of some extras and, most important of all, the inexperience of many who are now in charge of pricing policies.

While the present softness in some steel prices does not look like the 1938 disintegration of the price structure, there are some similarities. Excess capacity has led some steel companies to try to put one over on their competitors. What these fellows did not know, because they had no experience, is that it takes half a minute for a concession to get around. Then everyone who wants to use his idle equipment is in on the act.

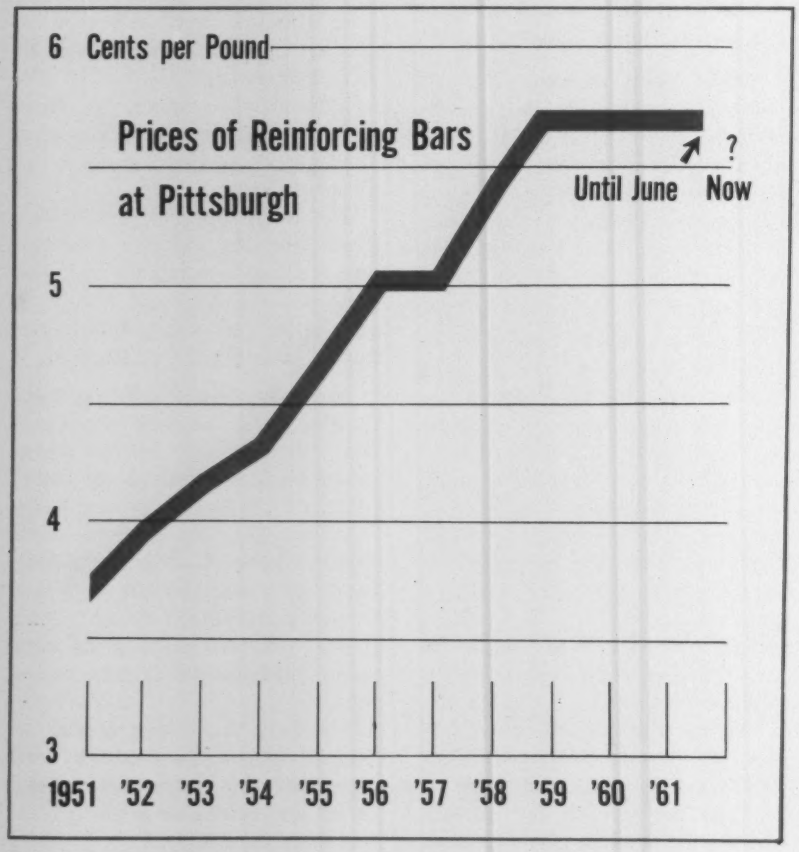
Not Entirely New — In some cases, the price cuts have been known for some time. The bigger steel companies assumed the weak spots would clear up after the cutters had their fill. It did not work out that way. That is why the stainless cuts started out softly, then more openly, and are now general. The same thing happened in some grades of linepipe.

More than 80 pct of recent linepipe orders in the medium sized tonnages have gone at reduced prices. That's why U. S. Steel Corp. finally cut the price on premium stuff—a paradox that made extra premium steel pipe cheaper than regular run of the mill linepipe in the same sizes.

Rebar in Chaos—The cut in reinforcing bar prices was poorly timed. U. S. Steel and others have known for at least a year that this market had been sticky, with prices off as much as $5 a ton. If they did not know this, then their intelligence was worse than CIA's Allan Dulles' in the Castro fiasco. But the withdrawing of the reinforcing bar price by the major maker—and by others who followed—came when the price was off from $6 to $18 a ton, depending upon whom you believe.

Now, with jungle prices ruling, the price of concrete reinforcing bars could go like the nail price did back in the late 1930's. At that time the jungle price on nails took it so low that some wags were thinking of inventing a nail machine in reverse—a machine which would turn nails into the wire from which they were made; the wire price was much higher than the nails.

What About Increases? — There have been coy remarks in some quarters that the price cutting might



be a prelude to a price increase. This is either high-level comedy or ignorance of the market. Steel firms are at each other's throats. They do not believe anything one tells the other.

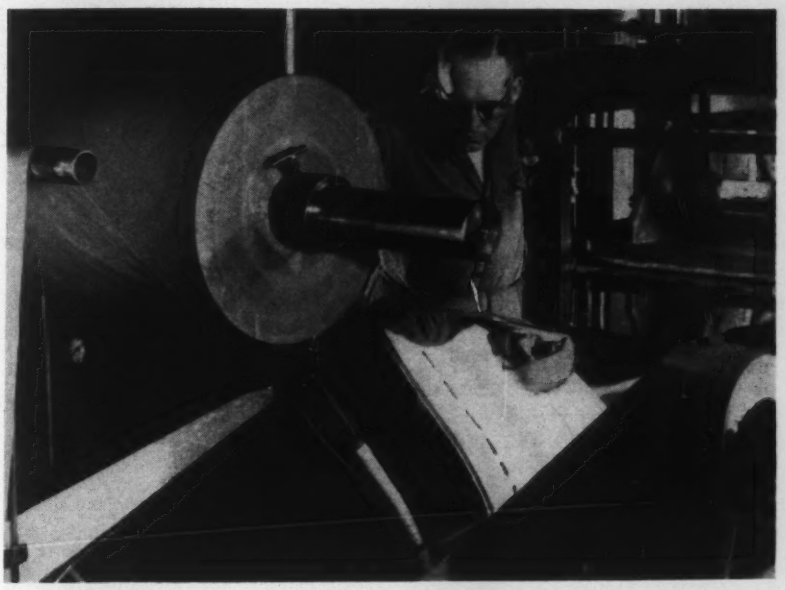
When a steelmaker hears what one customer is being offered by another steel company, he is vulnerable. No steel user with any purchasing sense is going to tell all he knows. But he will tell about concessions.

Extras Vulnerable—It seems, too, that in the present price hassles the extra charges in some cases are unrealistic. That is, they have no relation to the real cost of the special chemical and physical services. If they did, there would not be so many variations in overgrading.

The trouble with some of the present concessions is that they are like dope. As soon as one producer gets some tonnage, the rest of the steel producers catch up and give the same thing. Now, in order to keep the ball rolling, something new has to be added. No matter what steel sales officials think up, it has all been done before—before World War II and before 1933 when the NIRA attempted to fix prices and when prices were listed for the first time. (Before that time, it was a jungle with trade papers running the prices they thought represented the markets and the products.)

Next Steps—Some people think U. S. Steel may be getting ready to yank published prices altogether and go to a jungle period for all steel prices. This is hardly likely. The withdrawal of reinforcing bar prices was a judgment based on that item alone. But it has troubled the industry, thrown some customers in a tizzy, and broadcast the rumor that more cuts are coming.

So far, the steel price structure has not collapsed. Nor is expected to fall apart. But there are cracks, which, because of excess capacity, ineptitude in selling (lack of experience), sharp buying practices, and speed of communication, may widen.



BUFFED BRIGHT: Coils of stainless steel are put through this five-station buffing line to produce a bright, corrosion-resistant finish.

New Entry for Autos: Buffed Stainless

■ A major stainless producer refused to make it unanimous for bright annealing of automotive strip.

Universal-Cyclops Steel Corp. revealed this week it has installed a new buffing facility to give strip the extra brightness and corrosion resistance demanded by auto plants.

According to Universal-Cyclops, this is the first production-scale buffing line to be applied to stainless. Both sides of a coil are buffed in a continuous, in-line operation.

Eight to One—Mill officials says the new process is at least the equal of bright annealing from the standpoint of corrosion resistance and brightness. They claim buffing can assure a more uniform finish than bright annealing.

At the moment, this must be considered a minority report. Eight stainless plants have installed or ordered bright annealing furnaces. Another is negotiating a purchase. In Canada, Atlas Steels, Ltd., is installing a unit.

An Open Mind — However, Universal-Cyclops says its new product has been received with interest in Detroit and is undergoing tests now. It admits that earlier signs pointed to the adoption of bright annealing as an automotive standard. But the mill feels it moved soon enough to keep the door open.

There are indications that other stainless producers, as well as auto companies, are keeping their minds open. Six mills have received price quotations on buffing equipment.

In any case, it seems likely auto plants will concern themselves with results rather than methods. The automakers' push for better material centers on inspection tests and performance. They are telling suppliers what material must do and would just as soon stay away from process details.

GE Rejects Low Pricing Limit

Four Others Sign Consent Decree of Justice Dept.

Government's request that electrical manufacturers avoid unreasonably low prices has been rejected by GE.

Next move will probably be a court action by Justice Dept. unless agreement is reached.
By G. J. McManus

▪ Industry's price dilemma moved into sharp focus last week as electrical companies found themselves in a unique legal crossfire. (See Editorial, p. 5.)

Five builders of power switchgears faced a Justice Dept. demand that they avoid unreasonably low prices. This proposal evolved from cases in which the companies were prosecuted for taking steps to avoid unreasonably low prices. Four companies have signed the agreement.

Cordiner's View—General Electric Co. rejected the new demand, which was in the form of a consent decree. "Even with the government condoning it," said R. J. Cordiner, GE chairman, "we are not going to get involved in price fixing."

Mr. Cordiner said the proposed decree would force General Electric to sell at the prices of its least efficient competitor. The company is sticking to its rejection, even though it says it has been threatened with a divestment suit.

The consent decree turned down by GE has been agreed to by four other major companies, Westinghouse Electric Corp., Allis-Chalmers Manufacturing Co., Federal Pacific Electric Co., and I-T-E Circuit Breaker Co.

Next Step: Court? — It will be used as a model for agreements covering the 18 heavy electrical products, 29 companies, and 45 individuals involved in the case.

Westinghouse was reluctant to accept certain provisions of the decree, but felt it could live with the provisions.

Scene of the government's next battle with GE will be the Federal court in Philadelphia. Specifically at issue will be the refusal of GE to go along with other major electrical manufacturers in signing the consent agreement.

The outcome—if the battle comes off—will bear heavily on the future of the government's new hard-hitting policies of tight and tough control of business practices.

Justice Department antitrust officials expect to file the signed consent decrees with the court about the first of August, which will signal the start of the next round in court with GE, unless the company and the government come to terms before that.

Justice Dept. officials, now preparing their case against GE, say they have no plans now to ask for a split-up of the company, but may ask GE to sign an even tougher agreement, or ask the court to use such an agreement as the basis of a court order against the company. (For more on the government's position see box.)

Actions Elsewhere — Adding to the confusion, TVA and other government agencies are keeping up their clamor against identical bids on electrical equipment. Sen. Estes Kefauver is calling for legislative action in the matter. And while the Justice Dept. seeks to put a floor

Dept. of Justice's Viewpoint

In probing apparent inconsistencies in Government policies on industry pricing, IRON AGE Pittsburgh editor G. J. McManus called the Dept. of Justice for its reaction.

Following are the main points developed in a direct question and answer interview with a Dept. of Justice spokesman:

Q. Why are safeguards against price cutting sought in a case that involved holding prices up?

A. The electrical companies were not convicted of holding prices up. They were convicted of fixing prices by illegal means. The Justice Dept. is not concerned whether prices are high or low. It is concerned only that no illegal methods, collusive or predatory, be used in pricing.

Q. Why does the proposed consent decree go beyond the laws covering predatory pricing?

A. There would be no point in a decree that simply called for violators to obey the law. The proposed decree makes it a little easier to prove a case. But there is no real substantive difference between it and the law. How do you ever prove predatory intent except by showing economic effects?

Q. Has General Electric Co. been threatened with a divestment suit if it does not accept the proposed consent decree?

A. Nobody's b e e n threatened with anything. We're not disclosing our plans, but there have been no threats.

Q. Do price laws make it impossible for business to operate in a normal manner?

A. They haven't ruined the game of football because you can't gouge or knee. The entire bar has yet to come up with a case where a company was ruined because of laws governing pricing.

under prices, TVA is holding to the practice of buying foreign products if the price is low enough.

The electrical case is unusual in the way it brings together all the conflicting pressures at one time on one product line. The Justice Dept. decree embodies an unusual approach to the prevention of predatory pricing.

Industry's Problem — But the same basic problems exist for steel, automotive and other industries. If a company is too competitive, efficient, and successful, it faces trouble with one set of laws and agencies. If an industry or company shows signs of relaxing competitive drives, another group is waiting to lower the boom.

"The successful competitor having been urged to compete must not be turned upon when he wins," said Judge Learned Hand on this conflict in the 1945 monopoly suit against Aluminum Co. of America.

Yet, the clash in concepts seems to be getting sharper. Business has had to defend both flanks in the past, but not normally at the same time. General Motors Corp. was accused in 1957 Senate hearings of holding a price umbrella over the auto industry. Here, probers were charging a lack of aggressive competition.

Many-Sided Issue—Now the government seems to be closing in on all sides at once. Working to promote price competition by electrical companies and others are the Justice department crackdown; congressional agitation for new laws, and the prospect of new price probes.

At the same time, the Justice Dept. is reportedly confronting electrical men with the choice of either agreeing to price restraint or facing monopoly action. In the matter of restraint, General Electric objects to the vagueness of the price decree. The company says there is no way of knowing what might be considered an unreasonably low price.

GE's Position — Coupled with this vagueness, says GE, the decree takes a broad new view of predatory pricing. The company says it is willing to accept a stipulation against low prices that are intended to destroy competition. The idea of intent is an established part of piracy prohibitions in the antitrust and price discrimination laws.

ANOTHER MEETING?: In the growing battle over prices and pricing, Sen. Kefauver (left) and GE's President Ralph J. Cordiner may meet soon again. Here Mr. Cordiner talks to the Senator during recent hearings before Senate Monopoly Subcommittee investigating price-fixing.

However, the Justice Dept. wants restrictions against prices that would, or might, hurt competitors regardless of intent or other circumstances. GE says this wording would tie prices to levels that could be met by the least efficient companies.

The company points out it has been spending heavily for modernization. Efficiency is urgently needed to meet foreign competition, say GE officials.

Theories and Puzzles—Many are puzzled by the whole approach of the Justice Dept. in the consent decree. In a case involving conspiracies to hold prices up, the department is seeking safeguards against excessive price cutting.

One theory is that the crackdown was followed by a period of wide-open price cutting. There was pressure, then, to provide some protection for the smaller companies.

However, there is no clear backing for this theory in recent price behavior. The cartel scandal began unfolding in late 1959. Prices of heavy electrical equipment have been fluctuating vigorously over the past two years, says one buyer, but no one has been "beating the other fellow over the head."

Price Controls? — The other theory is that the administration is pushing ultimately for price and wage controls. An electrical man says the broad wording of the consent decree leaves no room for management discretion or judgment; a company could only ask Washington what prices would be acceptable.

All these notions are dismissed by one informed source. The Justice Dept. acted, he says, because it learned during investigations about the problems created by overcapacity and differences in size. It felt some restraint was needed to prevent destructive pricing.

IMPORTS: Motor vehicles from the U. S. claim a large share of West German imports.

EXPORTS: West Germany has favorable trade balance in world markets. This year will be even better.

Report From West Germany

Trade With U.S., World Markets

West Germany will boost its trade surplus higher this year. But there is some concern for the D-Mark and rising labor costs.

American exports to West Germany will hold at a high level.

By E. C. Beaudet

■ A sure sign of West Germany's robust economy is its favorable trade surplus with the rest of the world. This year the export-import gap is expected to spread even wider.

West German exports hit about $3 billion at the end of March and imports $2.5 billion. The $500 million difference is $135 million higher than first quarter 1960, a jump of 36 pct.

Despite this impressive showing, West German manufacturers are far from complacent about their export markets.

Points of Concern—For the most part they worry about: Effects of the revaluation of the D-Mark; rising labor costs; export financing; and growing competition from developing industrial nations of the world.

At the recent West German Industries Fair at Hanover, some of these fears were expressed by Alfred E. Schulz, board member of Demag A. G., one of West Germany's largest machinery builders. Exports account for 80 pct of the company's sales.

Mr. Schulz claimed that West German manufacturers must now strive even harder to overcome the effects of the D-Mark revaluation among foreign buyers.

Currency Problems—He regretted that some foreign buyers who fear other changes in the currency no longer will accept the Deutsche Mark as the basis for contract negotiations without a currency clause.

Mr. Schulz called for the West German government to guarantee a certain relationship of the D-Mark to foreign currencies by the state-owned Hermes Export Credit Insurance Company.

Financing a Factor—Other factors clouding the export picture for Mr. Schulz are the efforts of other countries in financing exports. While German exporters assume 20 to 40 pct of export risks, British industry, as an example, must assume only five to ten.

He also decried the fact that West German credit aid to under-developed countries does not require

West German Reports

This is the last of a series of seven articles on industrial West Germany.

Other reports in the series include: U.S. Firms at Hanover Fair, May 11; W. German Economic Expansion, May 18; VW's Nordhoff on World Trade, May 25; Labor Shortage, June 1; Machine Tool Markets, June 8; Steel Outlook, June 15.

Reprints of the entire series are available in booklet form, see right.

CONSUMER GOODS: A booming economy has stepped up demand for consumer goods of all kinds.

INDUSTRIAL GOODS: Backlogs of machinery builders were extended further at Hanover Fair.

the country receiving the credit to use it for purchases in West Germany, as other countries do.

While these are major problems, they have yet to make a serious dent in Demag's immediate sales picture. Most of its plants are in full operation. And, just recently, the company's Canadian plant lost an order for six compressors to a U. S. competitor who offered six months shorter delivery. The U. S. plant got the order despite a 35 pct higher price tag.

Labor Costs a Problem—For the long term, West German manufacturers are uneasy about steadily rising labor costs and the effect they will have on export markets.

Now, wages in West German manufacturing plants are the highest in Western Europe, except for Sweden. Including fringe benefits, they come to 78 cents an hour. This is a far cry from the U. S. average of $2.68. But they are held as a threat to future export competition by other European nations and new industrial nations.

Looking East — In their trade with Russia and Soviet Bloc Nations, few West German manufacturers have illusions about the future potential or stability of this particular market.

As one manufacturer put it, "The Russians go into the West last after seeking equipment throughout Russia and the East Bloc countries. You sell them one piece of equipment at a time and you don't sell it again. Since the Russians buy from a parts list, you don't ever get to meet the real customer."

U. S. Balance—Although it has a favorable trade balance overall, West Germany buys more from the United States than it sells.

Last year, the country bought some $1.4 billion worth of goods in the United States while selling some $89 million. West German imports from the U. S. in 1960 were about $350 million more than in 1959. Exports to the United States remained about the same.

A good part of this $350 million increase was due to a jump in exports by American metalworking plants.

Compared with 1959, here are some of the gains posted by U. S. metalworking industries in 1960: Machine tools and rolling mills, from $18.7 to $30.6 million; Aircraft and motor vehicles, from $26.9 to $61.7 million; office equipment, from $10.4 to $18.5 million; agricultural equipment and farm tractors, from $1.6 to $3.6 million.

German Shortages—So far, 1961 U. S. exports to West Germany look like they will stand up at least as well as those of 1960. The reason: West Germany's overall economy is still running full tilt; despite the trade surplus, there are shortages of some goods on the West German markets; backlogs of West Germany machinery and machine tool makers are still far out; the revaluation of the D-Mark to some extent has made U. S. prices more attractive.

The lure of the West German and total European market has caused U. S. companies to invest heavily in West Germany. Direct U. S. investments in the country more than trebled from 1950 to 1959, from $200 to $700 million.

Lately, there seems to be less interest by American manufacturers to build new plants in West Germany. The labor shortage is so severe that some manufacturers believe the employment problem is almost unsurpassable. They are more inclined to buy out an existing company (with its employees) or engage in cross-licensing.

Reprint booklets containing all seven of the articles in Report From West Germany are available as long as the supply lasts. Write Reader Service, The IRON AGE, Chestnut & 56th Sts., Phila. 39, Pa.

Ask for Reprint **No. 187**

Japanese Ships Invade Seaway

Midwest Trade Booms With Direct Link to Orient

Japanese ships have begun to arrive in Chicago, and Midwest shipping is booming.

With deeper harbors and new facilities, Lake Michigan ports are setting records. Japanese trade will add to the boom.
By K. W. Bennett

■ This week, the Masashima Maru will steam out of Lake Michigan en route to ports along the Great Lakes.

When fully loaded, this 11,900 ton freighter of Japan's big Iino lines (552,210 tons total cargo capacity) will begin a 42-day voyage. It will connect Chicago and the industrial Midwest with Yokahama, Kobe, Nagoya, Osaka and Hong Kong.

Second Ship — Though Masashima Maru is the second freighter of the Iino line to reach Chicago, Iino is still in the process of opening its Chicago office.

It is one of four ships assigned by Iino to the Chicago run. They will be joined by ships of another major Japanese line by mid-summer.

Mitsui Steamship Co. will dock its first vessel in Chicago on July 25. At that date, two Japanese ships per month will put in at Chicago and Milwaukee.

Big Demand — United States Navigation Co., agent for Iino, reports that demands for space by U. S. shippers already exceed the tonnage the freighters can take on at Lake Michigan ports. Space is allocated so that U. S. exports can be picked up along the length of the Great Lakes run.

FAR EAST TO MIDWEST: Muneshima Maru (above) was the first Japanese ship to call at Great Lakes ports. A second, Masashima Maru, leaves for Japan this week. They are two of the four ships assigned to the run by Iino Lines. Another line will start service late next month.

The advent of the two Japanese steamship companies, and a minimum of 10,000 tons of ship space per month, marks the real arrival of the Orient in the Midwest.

A year ago, there were five Japanese trading companies with sales offices in Chicago. At the moment, the count is 14.

Cargo Varies — Incoming Japanese cargo already includes canned food, ceramics and machinery. Outbound cargo includes ferrous and nonferrous scrap, tinplate, machinery, steel billets, synthetic rubber, nickel scrap and even paper and rags.

There's been considerable Midwestern interest in Japanese purchases of steelmaking scrap. But Japanese lines are not seeking steelmaking scrap business, according to a U. S. Navigation Co. spokesman.

Heavy Year — Regular freighter service from the Orient is starting when Lake Michigan ports are already on the way to their best year.

Milwaukee, with a 25-ft harbor depth, has an edge. This week, two 10,000-ton grain cargo ships are leaving port. It marks the first shipment of that much tonnage from the inland ports.

Milwaukee earlier forecast a total of 350,000 tons of shipping in 1961. Port Director H. C. Brockel told The IRON AGE that 1961 shipments are already 350 pct over the 1960 period, and that he now expects a 500,000 ton year.

Scrap Factor — Steel scrap is a major factor. Milwaukee shipped 10,000 tons of ferrous scrap in the first five months last year.

Thus far in 1961, the tonnage has skyrocketed to 99,000 tons.

Mr. Brockel expected to ship 150,000 tons of steelmaking scrap in 1961. He's now confident that at least 250,000 tons will be shipped.

Problem: Lack of pep -- and people -- due to bad air

This plant needs make-up air! If production is off because your workers lack pep or become sick from bad air, check your exhaust system! Its fans may be removing air faster than you replace it. This causes a vacuum that can put your plant ventilation dangerously out of balance. Your plant needs make-up air...a supply of new air to replace exhausted air.

Without make-up air, the vacuum can cause down drafts in combustion flues and exhaust hoods, exposing workers to carbon monoxide and other dangerous fumes. Vitality sags. Absenteeism rises. Production drops.

Solution: install a make-up air system -- fans to bring in fresh outside air, and heaters to temper it. You cancel out the vacuum, ease the load on exhaust fans and the regular heating system. No ventilation plan is complete without make-up air.

For technical help on make-up air, see your Consulting Engineer. Or call in Sturtevant application engineers. They're experts in handling air...whether you want to move it, heat, cool or clean it. J-80710

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INDUSTRIAL BRIEFS

Open House — Interstate Steel Co. held an open house last week at its new $1.1 million office and warehouse in Des Plaines, Ill. The addition doubles the capacity of the steel service center.

Reactor Job—West Allis, Wis., Works, Allis-Chalmers Manufacturing Co., will build the reactor for the La Crosse nuclear project. Design and engineering will be handled by the company's nuclear power dept. at Washington.

Labrador Seal—Henry J. Kaiser Co., Canada, Ltd., Montreal, will design and build a beneficiating plant for Wabush Iron Co., Ltd., at Wabush Lake, Labrador, Newfoundland. Premier Joseph L. Smallwood of Newfoundland announced the plant will be part of large scale mining, processing and housing installations at the Wabush project to produce high-grade iron ore concentrate.

Canadian Arms — The Defense Dept. has awarded a contract to the Canadian Government to build a small, tracked lightweight carrier for the U. S. Army. The highly mobile one-half ton carrier will be developed under the U. S. Army-Canadian Development Sharing Program.

Three-in-One — Avondale Holdings, Ltd., Stratford, Ontario, has been purchased by Federal-Mogul Service, Ltd., Toronto, a subsidiary of Federal-Mogul-Bower Bearings, Inc., Detroit. The deal includes Avondale's three subsidiaries.

French Entry—National Screw & Manufacturing Co., Cleveland, has acquired controlling interest in Forges et Boulonneries Hermant Hicguet et d'Ars-sur-Moselle, largest manufacturer of industrial fasteners in France.

Glidden Gets — Magnetic Powders, Inc., Johnsonburg, Pa., has been purchased by Glidden Co. Magnetic makes iron powders for magnetic cores for radio, television, sonar and radar equipment.

Federal Finish—Federal Machine & Welder Co. has merged into the McKay Machine Co., Youngstown. It is now known as the Federal-Warco Div. of McKay.

Alabama Buy—Woodward Iron Co., Woodward, Ala., is acquiring all assets of Lynchburg Foundry Co., Lynchburg, Va.

Etching Merger—Etching Corp., San Francisco, and Allegri-Tech, Inc., Nutley, N. J., have merged. Etching will continue to produce printed circuits and electronic assemblies as a div. of Allegri-Tech.

Clock Control—Robertshaw-Fulton Controls Co. is acquiring Lux Clock Manufacturing Co., Inc., Waterbury, Conn. Robertshaw has completed three new systems of automatic controls, including an automatic time program.

Stock Trade—Air Reduction Co., Inc., New York, is acquiring Speer Carbon Co., St. Mary's, Pa., in a stock exchange. Speer Carbon produces carbon, graphite and electronics industry products.

Sound Building — Howe Sound Co., New York, has acquired for cash Labeled Metal Products Corp., Chicago, a metal building products manufacturer.

"We're in a definite depression. Our profits are back to normal."

Virginia Sale — Fontaine Truck Equipment Co. is buying the Birmingham, Ala., steel fabricating plant of Virginia Steel Co., Inc., for $200,000. Fontaine makes truck bodies and equipment.

British Buy—Air Products, Inc., Allentown, Pa., has acquired 100 pct interest in its British subsidiary, Air Products, Ltd., from the Butterley Co. of London, England. The deal involves an exchange of $2.436 million cash.

Electronics Move — SEG Electronics Co., Brooklyn, has acquired Solar Electronics Corp., New York. The Solar line will be broadened, with emphasis on communication equipment.

Tube Takeover — Cerro Corp., New York, has acquired Viking Copper Tube Co., Cleveland, fabricator of thin-wall copper tube for the air-conditioning and control instrument industries.

Four-for-One—A new company, Wallace Herdlein & Associates, Inc., with headquarters at 208 LaSalle St., Chicago, will specialize in designing, engineering and manufacturing of metal cleaning, paint finishing and air handling systems, and ovens of all types.

Foundry Switch — Sivyer Steel Casting Co., which operates steel foundries in Milwaukee and Chicago, has acquired Riverside Foundry, Bettendorf, Ia.

Division Sale — American Steel Foundries, Chicago, has sold the Elmes and King Div., Cincinnati, to the Elmes & King Manufacturing Co., a new corporation headed by Flug & Strassler Associates.

Pressing Ahead—Baldwin-Lima-Hamilton Corp.'s Industrial Equipment Div. at Eddystone, Pa., has received contracts topping $500,000. It will build a 2200-ton aluminum extrusion press valued at $366,000 for Pax Metal Corp., Van Nuys, Calif. For $150,000, the company will build one of the largest hydrostatic bearings ever made, a 14-ft-diameter ring assembly for North American Aviation Co.

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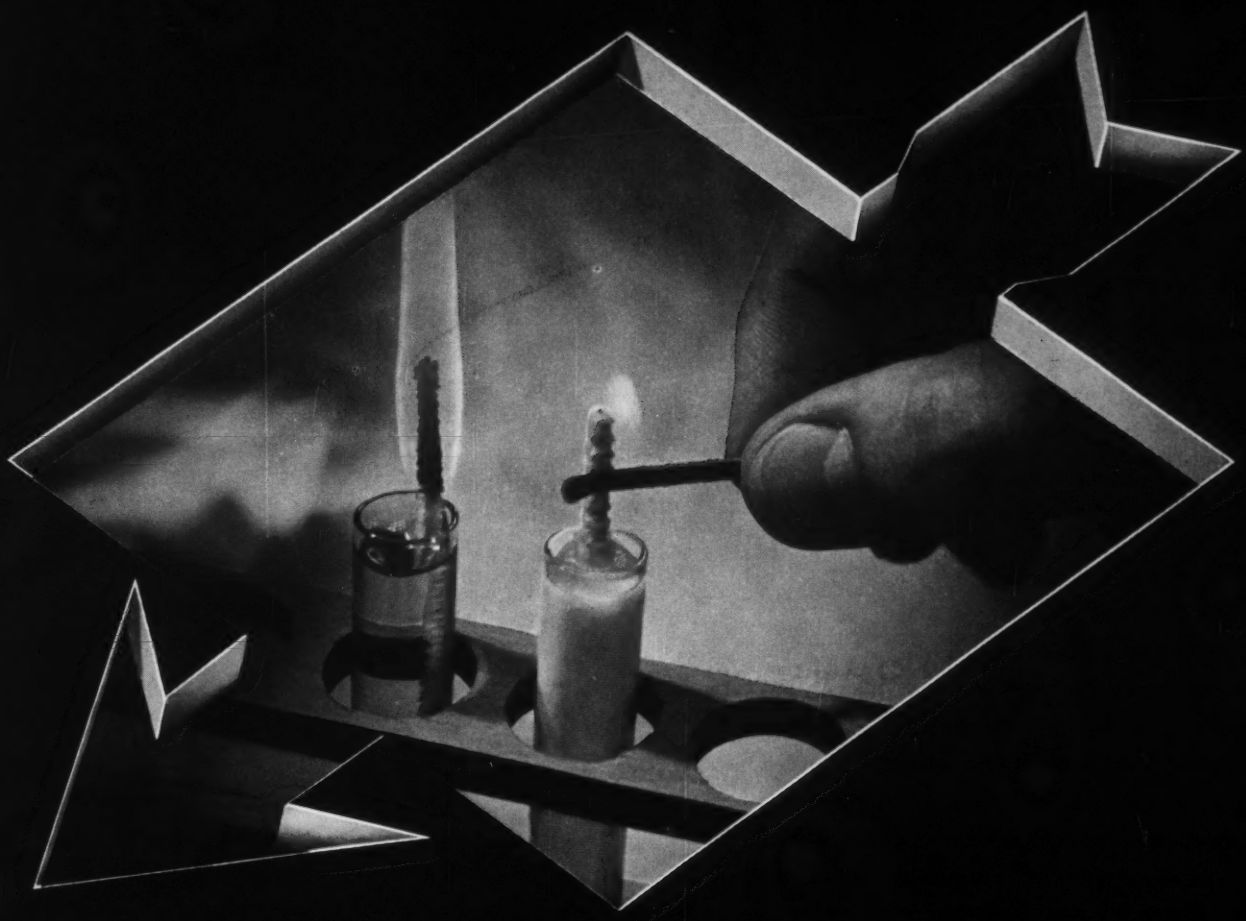

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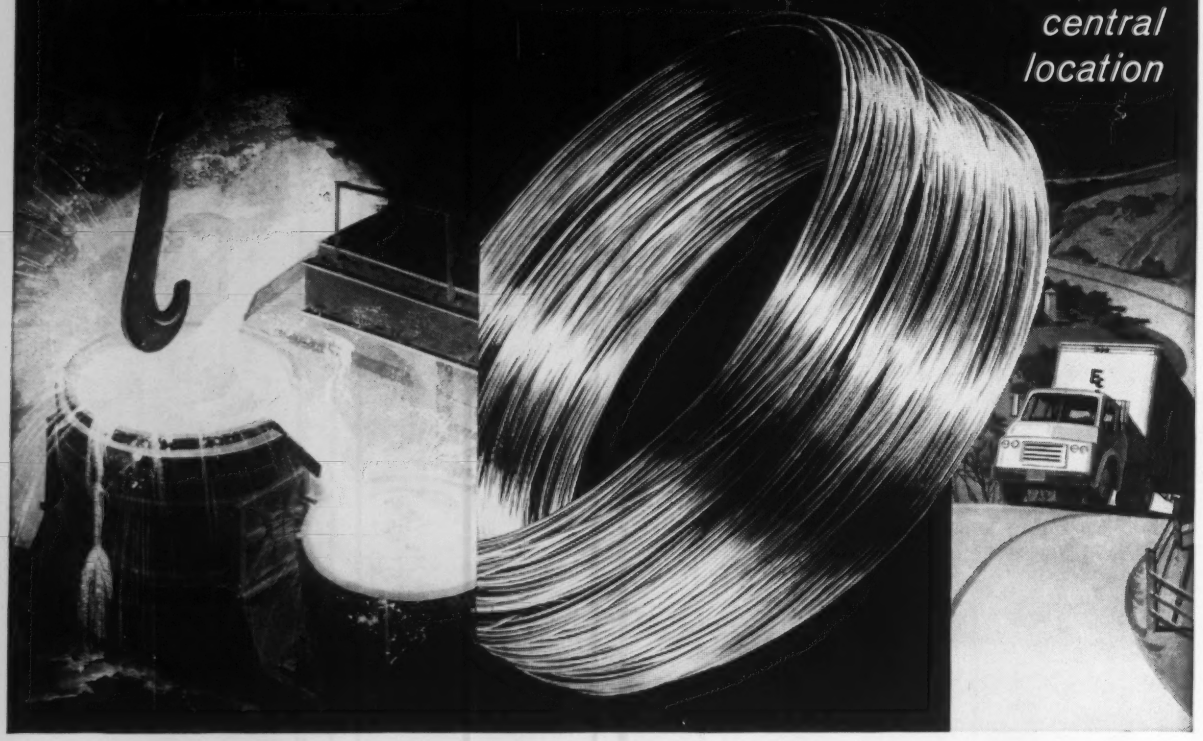

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Economists Are Good Managers

Top managers are often selected because their talents are needed to meet the problems of the times.

For that reason, business economists will have a growing voice in management.

■ There are vogues in management as there are in other areas. Tomorrow's managers will be selected to handle tomorrow's problems.

This is a natural development much the same as adapting plants and sales methods to meet market changes. Over the years the men who move up to the top are selected on the basis of the business climate.

Changing Patterns—There have been vogues in picking top managers from production, from sales, and from financial areas of the company. What trends are likely in the future?

Based on current trends, some predictions can be made. It seems clear more top managers will be men with backgrounds in quality control, international marketing, research and development, market research, and economics.

One developing profession—business economics — will make increasingly important contributions to management. How big that role will be depends on corporate needs.

Expanding Role—But one business economist predicts a growing future for those in his profession. He's Dr. Adolph G. Abramson, director of economic planning for SKF Industries, Inc.

In a recent speech he declared, "The business economist is already a familiar and effective member of the business community. He now contributes to the solution of a multitude of business problems—both internal and external and at different levels of management.

"His role in the future is likely to expand because more economists are moving into top management, because business is becoming more complex, and because relations with 'outside' groups, particularly government, are becoming more critical."

In the future, business economists will also have a bigger hand in the leveling out the ups and downs of the business cycle, Dr. Abramson forecasts. This will come, he says, because the business community is assuming partial responsibility for achieving national economic objectives.

One Way or Another—"If individual company programs designed to meet national objectives are developed, the business economist will probably do the job. But if these programs are not developed and even greater responsibility and authority is placed on government, the role of the business economist is still likely to expand."

Discussing his profession Dr. Abramson points out 45 pct of the present members of the National Association of Business Economists have the words "economist" or "economics" in their title.

Investment Abroad Aids U.S.

■ Contrary to widespread belief, foreign investment expands rather than shrinks the export market for goods produced within the United States.

This point is made in a report filed by the Machinery and Allied Products Institute with the House Ways and Means Committee studying taxes on overseas profits of U. S. companies.

Important Cycle—Private investment in plants abroad benefits the U. S. economy and contributes substantially to domestic employment, MAPI contends. (For the views of others on this question see IA, June 15, p. 77.)

According to MAPI, the experience of capital goods manufacturers shows investment in foreign subsidiaries and branch plants has opened and expanded export markets for products made in the U. S.

Proof Cited—One company, the report notes, found 11 pct of its employees in the U. S. owe their jobs to the company's foreign operations. And, in this and other cases, the foreign subsidiaries are important markets for components manufactured here.

Many companies report sales forces set up by overseas units create markets not only for the products of these plants, but for the parent company by expanding the export market.

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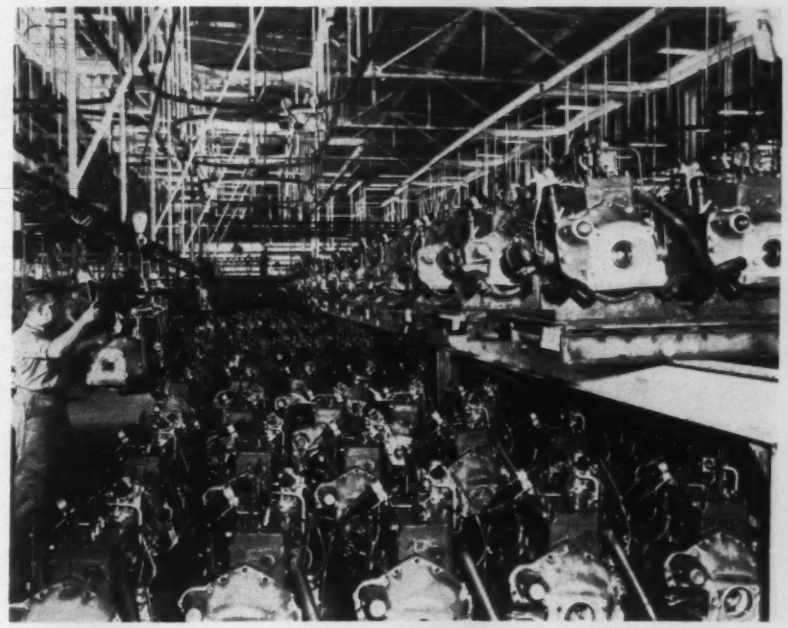
Automakers Ready New Engines

Projects Include New V-4s and V-6s as Well as V-8s

The gasoline engine is far from being classed obsolete.

Powerplants due for new models to be introduced in 1962 will have some new shapes. But the materials will be conventional.
By A. E. Fleming



TAKE YOUR PICK: New engines will add to inventory problems.

▪ Reports on 1962 model engine activities are many and varied. Production schedule of Ford Motor Co. engines for the "Canadian X and Y" (115-in. wheelbase cars) is now set at five-a-day at the Cleveland engine plant. Operations are running five days a week, for a 25-engine-a-week total (IA—June 15, '61, p. 89).

Engineers apparently have settled on the 221-cu in. displacement version for the new models. Estimate on horsepower is in the range of 140, although the advertised horsepower hasn't yet been determined.

Eights and Fours—The new V-8 powerplant, light and compact, is being road tested in Falcon and Comet cars. Apparently the compacts are more closely matched to the 115-in. wheelbase newcomers than are regular size Fords.

Engine component suppliers claim they have not been contacted by Ford on jobs for the little Volkswagen-size car called the Cardinal.

A machinery builder says that the machine he made for Ford for a motor part was shipped to Cologne, Germany, where the part is to be manufactured. This engine is said to be a cast iron V-4 of 90-100 cu-in. displacement and rating of 55 hp.

Home and Abroad—Production of the Cardinal engine, of which there will be two versions according to various sources, is said to be getting underway for the European model.

If so, this would indicate fall introduction of the car overseas. The American model, with a slightly bigger engine, may not arrive until 1962, perhaps in the spring or summer.

Original production schedules called for output of 370,000 Cardinals in the first year of production —170,000 overseas models and 200,000 for the U. S.

V-6 at Buick?—A V-6 is said to be in the preparation stages for the Buick Special. This is reported to be a cast iron engine of lower horsepower than the present aluminum V-8. The 155 hp V-8 reportedly would remain as an option.

Chevrolet has two new engines up its sleeve—an inline six-cylinder and a four-cylinder job. These will go into the new middle range of cars being readied for fall introduction.

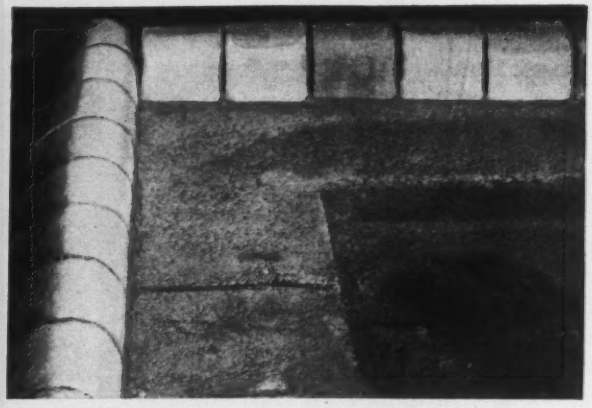
The four is said to be a cutdown copy of the six. Thus, much of the machining for both engines can be done on the same equipment. Various parts will be interchangeable.

Crash Program—The go-ahead on the coming four resulted in a crash tooling program. Originally, it was planned for introduction on 1963 Chevys.

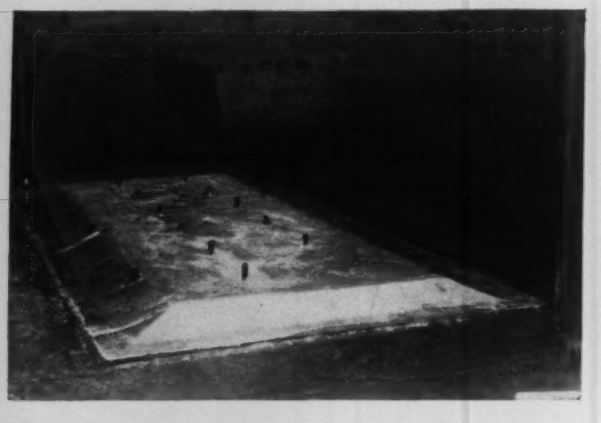
The new six reportedly is smaller and lighter than the 235 cu in., 135 hp now employed.

The four is said to fall into the 150-160 cu in. range, with horsepower of from 90 to 110.

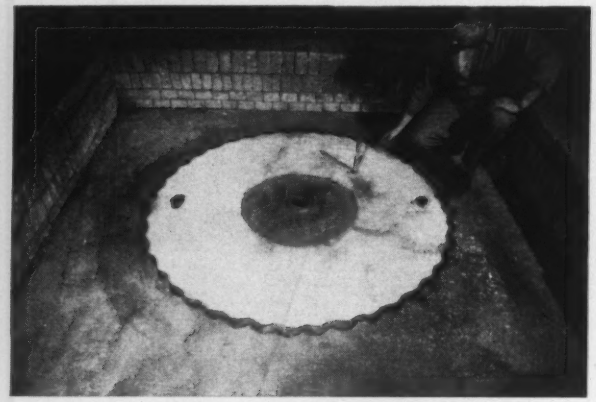
B&W Kaocrete-D, vibrated in place, provides high resistance to the atmospheres encountered in this coke oven door installation. Furthermore, the high erosion resistance and long service life without loss of strength of B&W Kaocrete-D add to its suitability in this application.



A typical monolithic curb wall construction in an annealing furnace using a carbon monoxide atmosphere. The greatly reduced number of joints in which sealing sand can penetrate prevents structural spalling of B&W Kaocrete-A upon heating and cooling. Being monolithic, gas leaks are practically eliminated.



A radiant tube annealing furnace with a base of Kaocrete-A, backed up with Kaolite-20, one of B&W's insulating refractory castables. This furnace operates at approximately 1700 F in a 65% CO atmosphere.



A stack annealing furnace with pedestals cast of B&W Kaocrete-A. The atmosphere is slightly above 8% CO. B&W Kaocrete-A offers strength, volume stability and resistance to carbon monoxide disintegration.

How B&W refractory castables perform in atmosphere applications

One of the difficult problems facing furnace builders and operators in the metals industries is the effect of atmospheres on refractory linings. That's why B&W offers several *specialized* refractory castables for this service, each possessing strength, volume stability and the refractoriness necessary to assure long, trouble-free service.

Take B&W Kaocrete-A, for example. Because of the careful selection and processing of special aggregates and other ingredients with low iron content, this material resists disintegration or other effects produced by high concentrations of CO or H_2 atmospheres. B&W Kaocast and Kaocrete-32 provide the same excellent service at higher temperatures while lightweight Kaolite-20 is outstanding as an insulating castable in atmosphere applications.

B&W Bulletin R-35A gives additional information on versatile B&W refractory castables. Write for your copy of this bulletin to The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N. Y.

R832

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

L.A. Smog: It Is Still a Problem

Big Market Awaits Successful Anti-Smog Device

Many residents of Los Angeles County have already moved because of the persistent smog problem. And others will follow.

Because of this, a good anti-smog device could open up a $760 million market.
By R. R. Kay.

■ Ten thousand persons have been told to move out of Los Angeles. Smog is a menace to their health.

So reports the Los Angeles County Medical Assn. after polling 500 of its members. Some 77 pct believe air pollution is bad for a person's health. These doctors have advised 10,000 patients to move out of the county. Some 2500 did.

Costs Money—Dirty air costs money. The Armour Research Foundation says the cost is $65 per person annually. That's in added prices and taxes—and to clean up his clothes and his home.

Every segment of metalworking in California spends huge sums to keep the air clean. Just in Los Angeles, industrial controls keep 3400 tons of pollution out of the air every day.

Experts agree that auto exhaust is the No. 1 culprit. There's a big push on to find control devices.

Health officials are worried about the growing car population. The Los Angeles area alone has over three million cars. That's almost a three to two edge over its closest rival, New York City.

A Law—California law makes it a must for all new motor vehicles to have an anti-smog device within a year after the state approves two such devices. Used trucks and buses must have one in the second year. By the third year, no motor vehicle may operate without one.

This law is now on the books for a year. But it can't be enforced until two devices are approved. So far, there isn't even one.

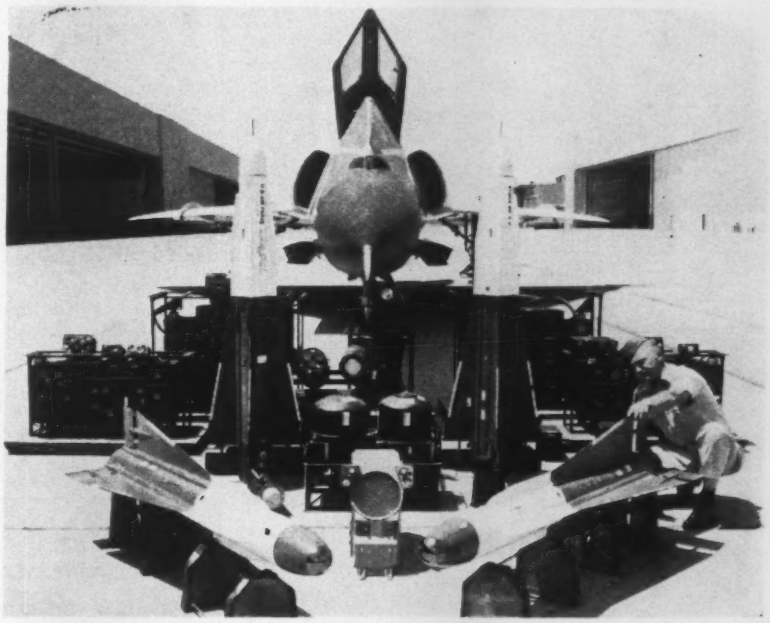
At the moment, the prospects are dim for approval of two anti-smog auto devices. California's State Motor Vehicle Pollution Control Board has culled 15 devices. Five were thrown out—not even tested. Of the 10 left, only one looks good.

All around the country, there's high interest in the Los Angeles smog problem. If it's licked there, a big new industry will be born.

Big Market—Look at the market in California alone. Best guess is that the device will cost from $50 to $150. Suppose it cost $100. That's $660 million for the state's passenger cars. Add to this the one million trucks on the road. Here's a $760 million market.

Many well-known companies are going after the anti-smog device business. Here are some of them: Thompson-Ramo-Wooldridge, Inc., Cleveland; Wolverine Tube Div. of Calumet & Hecla, Inc., Allen Park, Mich.; Chromalloy Corp., New York, N. Y.; Oxy-Catalyst, Inc., Berwyn, Pa.; Arvin Industries, Inc., Columbus, Ind.; Universal Oil Products, Des Plaines, Ill.

F-106A Delta Dart to Be Upgraded



NEW EQUIPMENT: The F-106A Delta Dart is one of three types of supersonic jet interceptors to be equipped with an infrared search and track device soon. It's part of an Air Force-Hughes Aircraft Co. modernization program. The F-102A and F-101B will also be upgraded.

2300° HOT . . . *but not bothered!*

Retort made of HASTELLOY alloy X is removed from furnace after brazing cycle at 2300 deg. F.

RETORTS made of HASTELLOY alloy X and used for controlled-atmosphere brazing of rocket and missile parts at 2300 deg. F—last up to twice as long as retorts previously used. The alloy's high strength and resistance to oxidation and thermal shock make thinner walls possible. This in turn shortens heating cycles by 25 per cent . . . and cuts fuel costs by as much as 40 per cent.

Total savings during the 100-day lifetime of the retorts is about $1000—resulting from lower first cost, shorter heating cycles, 150 additional cycles per retort, and reduced costs for fuel and welding maintenance.

Resistance to stress, to thermal shock, to erosion, corrosion, and fatigue, are typical properties that make HAYNES alloys so extremely useful in jet engine turbine wheels, in ramjets, missiles, rockets, as well as industrial heat-treating applications.

Whether investment- or sand-cast, rolled, wrought, vacuum melted, or air melted, there's a HAYNES high-temperature alloy to meet your needs.

HAYNES ALLOYS

HAYNES STELLITE COMPANY

Division of Union Carbide Corporation
Kokomo, Indiana

Address inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, New York.

UNION CARBIDE

"Haynes," "Hastelloy," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Democracy Needs Top Tooling

Metalworking production in the next ten years could be a major factor in the cold war.

The government, especially the military, is already starting a quiet technological push.
By R. H. Eshelman

■ Products and equipment turned out by metalworking industries in the next decade will determine whether democracies can surmount the communist challenge.

That, in the final analysis, is what military, government and scientific experts have been trying to tell the American public in various ways.

Vital importance of defense production—of the right kind—is underscored by physicist Herman Kahn. He was a central figure in the Rand Corp.'s secret but exhaustive study on how a democracy can survive in an increasingly hostile, communistic world equipped with nuclear armament. The answer: This country must gird for more production of a scientific, versatile defense system.

Now Underway — Evidence in Washington at the recent National Machine Tool Builder's Assn. meeting reveals that this build-up is already quietly underway. It is likely to be a most important fact in national life in the next decade, if testimony now being given Congressional committees is any indication.

"We face scientific, economic, and political challenges unlike any we have ever faced before," says Joseph S. Imirie, assistant secretary of the Air Force.

Sometime ago, S. E. Skinner, an executive vice president of the General Motors Corp., summarized the nature of the new type of defense production effort.

He has often pointed out that the defense effort requires continued production support from industry. Now it requires assumption of a new responsibility. He says: Assistance to the military in research and engineering development is needed.

Engineers have been hearing of the great drive for reliability. But that is only one phase of the total manufacturing effort needed, according to experts. People like Fred Hill and John Marsh of the Air Force's manufacturing technology organization emphasize need for concurrency. Conventional procedure calls for long drawn out lead time for advance development, engineering prototype make and test, tooling up and finally manufacture.

A Luxury—Defense production can no longer afford this luxury, they note. Instead, these activities must be carried out concurrently, on a compressed schedule. Reason: There is no longer time between hostile action and an effective response to update weapons.

Military manufacturing R & D programs, details of which cannot now be revealed, show this new awareness. Long range plans are underway in producibility studies.

Much of the actual advanced research is contracted to industry. Capability, rather than size, is the basis for awards. The military, as never before, is willing to listen to new proposals and ideas in manufacturing technology.

It Opens Up New Opportunities

PRACTICAL AND PROFITABLE: G. A. Gray Co.'s new boring, drilling and milling machine eliminates costly tooling and permits fast changeover from one job to another. It's teamed with a readout numerical control and makes short runs practical and profitable.

J. M. McGregor, elected senior vice president, Signode Steel Strapping Co.

Allis-Chalmers Mfg. Co.—G. E. Hall, appointed manager, sales development, Construction Machinery Div.; J. J. Dickson, appointed asst. manager, Nuclear Power Dept., Washington; D. W. Erskine, appointed manager, Engine Engineering, Harvey Works.

Chicago Foundry Co. — R. E. Wells, elected president; C. E. Fausel, elected vice president, operations; T. W. Scanlan, elected treasurer.

Fox Steel Pipe Corp.—W. H. Fielder, elected vice president, operations.

Allegheny Ludlum Steel Corp.—R. L. Harding, Jr., appointed director, marketing; H. S. Wacker, named manager, commercial research; C. L. Bohrer, appointed manager, Pacific District; A. N. Haig and R. R. Richards, appointed sales and service engineers, Los Angeles and San Francisco areas.

Armco Steel Corp.—R. P. Hindman, named manager, and W. R. Gealey, named general superintendent, Butler plant. J. E. Kunkler, named general manager, Atlantic area, at Middletown, O.; A. J. Mistler, named head, Central Area, at Topeka, Kan.; and W. W. Mains, named general manager, Western Area, Denver, Armco Drainage & Metal Products, Inc.

Atlas Steels Ltd.—Richard Ellis, appointed manager, Canadian Field Sales; John Fowlie, named manager, Hamilton branch; James Sutherland, appointed manager, Windsor branch.

Sel-Rex Corp.—O. A. Stocker, appointed district manager, New England States.

National Ultrasonic Corp.—R. C. Kendall, named sales manager.

H. P. Young, elected vice president, manufacturing div., Signode Steel Strapping Co.

Kaiser Aluminum & Chemical Corp.—M. W. Marcoux, named manager, sales development; W. O. Cleary, named manager, packaging equipment.

Colorado Fuel & Iron Corp.—J. R. Purdy, appointed superintendent, Pueblo coke plant.

Cerro Corp. — A. M. Massie, elected to the board of directors.

(Continued on P. 108)

S. A. Fronek, appointed product sales manager, silicon steels, Crucible Steel Co. of America.

R. E. Lambert, appointed general manager, Bearing Plant, Link-Belt Co.

F. J. Durzo, named executive vice president, Jeffrey Manufacturing Co.

"The superior quality is evident at first glance . . .

. . . that's why we recently decided to stock ***LUSTERIZED***® *cold finished steel bars"*

SAYS J. T. ERWIN, VICE-PRESIDENT OF ELLIS-ERWIN SUPPLY CO., INC., TAMPA, FLA., who stands in the group at the right with J. E. Ellis, Jr., Sales Manager, W. Gray Ellis, Purchasing Agent and E. C. Cox, Office Manager.

BLISS & LAUGHLIN LUSTERIZED bars are immediately distinguishable from ordinary cold finished steel bars in the racks at Ellis-Erwin, Mr. Erwin reports. Mr. W. Gray Ellis and Mr. Erwin are shown checking the close tolerance and superior finish of a Lusterized bar.

THE SAVINGS that can be realized during production with Lusterized Finish bars are figured by Mr. Erwin and Mr. Ellis.

When a long-established steel service center decides to concentrate on selling a particular line of cold finished steel bars, the bars obviously must be superior.

That is precisely why Ellis-Erwin Supply Co., Inc., Tampa, Fla., selected Bliss & Laughlin Lusterized Finish steel bars.

Mr. J. T. Erwin, Vice-President, writes: "We intend to expand our cold finished sales considerably in 1961. There is a marvelous opportunity in our area with your products. The exclusive quality-pluses and the fast service you render will help us achieve our goal of furnishing the best products to our customers . . ."

This is another example of why more progressive steel service centers stock and recommend Bliss & Laughlin Lusterized Finish bars than any other cold drawn bars.

BL-613

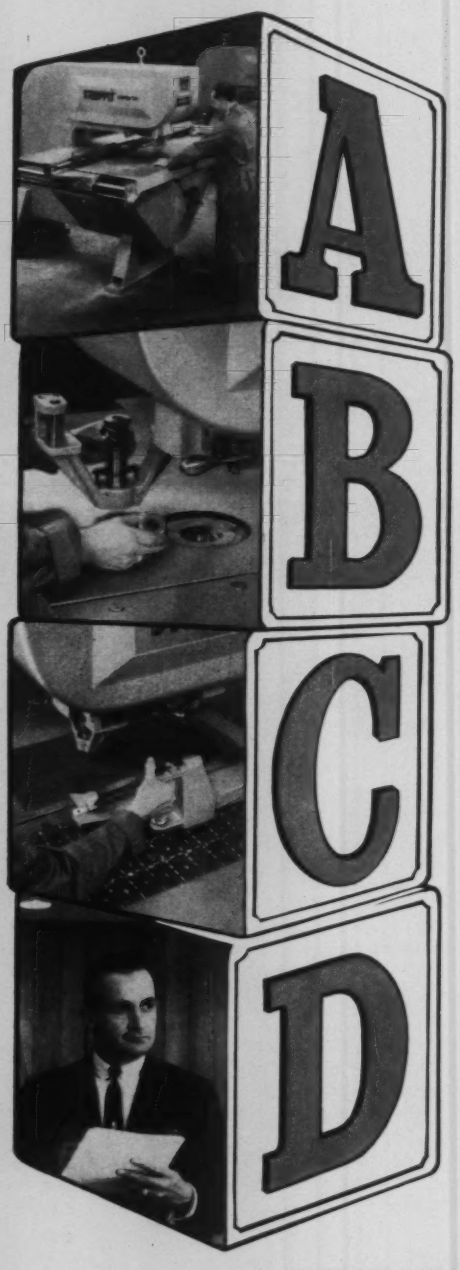
Leading Independent Producer of Cold Finished Steel Bars

BLISS & LAUGHLIN

GENERAL OFFICES: Harvey, Ill. • MILLS: Harvey, Detroit, Buffalo, Los Angeles, Seattle, Mansfield, Mass.

Specialists In Finish, Accuracy, Straightness, Strength and Machinability

BUILD A BETTER PRODUCT WITH STRIPPIT SUPER 30 FABRICATOR



A multi-purpose, single station sheet metalworking machine, the STRIPPIT Super 30 Fabricator punches round and shaped holes in workpieces up to 60" wide... any length. Punches close-centered hole clusters in material to ¼" thick . . . nibbles straight or contour lines in ⅛" material ...notches 90° corners, radii and special edge notches in material up to ⅛" thick.

Big savings in time are standard! STRIPPIT's Swing-Shift Punch Holders permit you to change punches from either right or left in *seconds*. STRIPPIT's Micrometric Back and End Gaging System permits rapid, precise positioning of workpieces. Set dimensions directly to thousandths.

Convert STRIPPIT Super 30 Fabricator to an efficient medium run production unit simply by adding our Duplicator attachment. Another useful accessory is our Dupl-O-Scope, a high quality optical instrument designed specifically for translating blueprints, drawings, etc. into accurate templates or "one-of-a-kind" finished pieces.

Don't hesitate to call your STRIPPIT Tool & Methods Engineer. He can arrange a demonstration at your plant that will show you ways to cut costs with the STRIPPIT Super 30 Fabricator or other STRIPPIT machines and systems. Write for Catalog 30S.

WALES **STRIPPIT** INC.

202 Buell Road **Akron, New York**

In Canada: Strippit Tool & Machine Company, Brampton, Ontario; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: Kearney & Trecker—C.V.A. Ltd., Hove, Sussex England.

(Continued from P. 106)

H. A. Markle, Jr., appointed director, engineering, Fuller Co.

Eastern States Steel Corp.—A. P. Stanton, named vice president.

United Air Lines—M. H. Whitlock, named vice president, line maintenance; O. T. Larson, elected vice president, transportation services, Western; F. A. Brown, appointed asst. vice president and general manager, transportation services, Eastern.

Wheeling Steel Corp. — F. M. Rich, named vice president, planning; G. S. Coleman, appointed manager, technical services.

General Motors Corp. — Leon Sarkisian, appointed manager, dealer business management dept., Sales Section; W. D. Kuni, appointed investment manager, Motors Holding Div.

Benthall Machine Co.—M. D. Gerald, appointed manager, Foundry Div.

Brooks & Perkins, Inc.—W. O. Chamberlin, elected vice president, marketing.

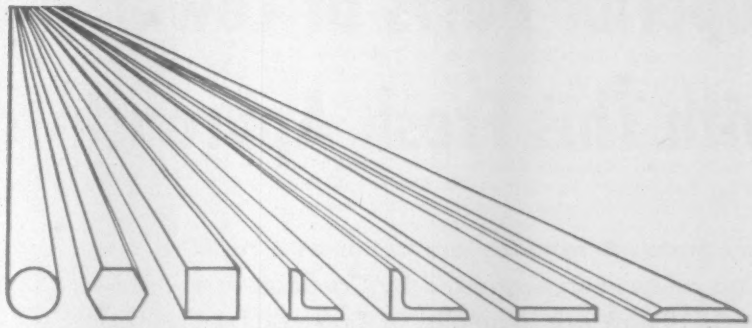
Air Reduction Sales Co.—W. T. Davis, appointed supervisor, manufacturing engineering, cryogenic engineering dept.

Illinois Gear & Machine Co.—R. L. Durgin, elected vice president.

(Continued on P. 113)

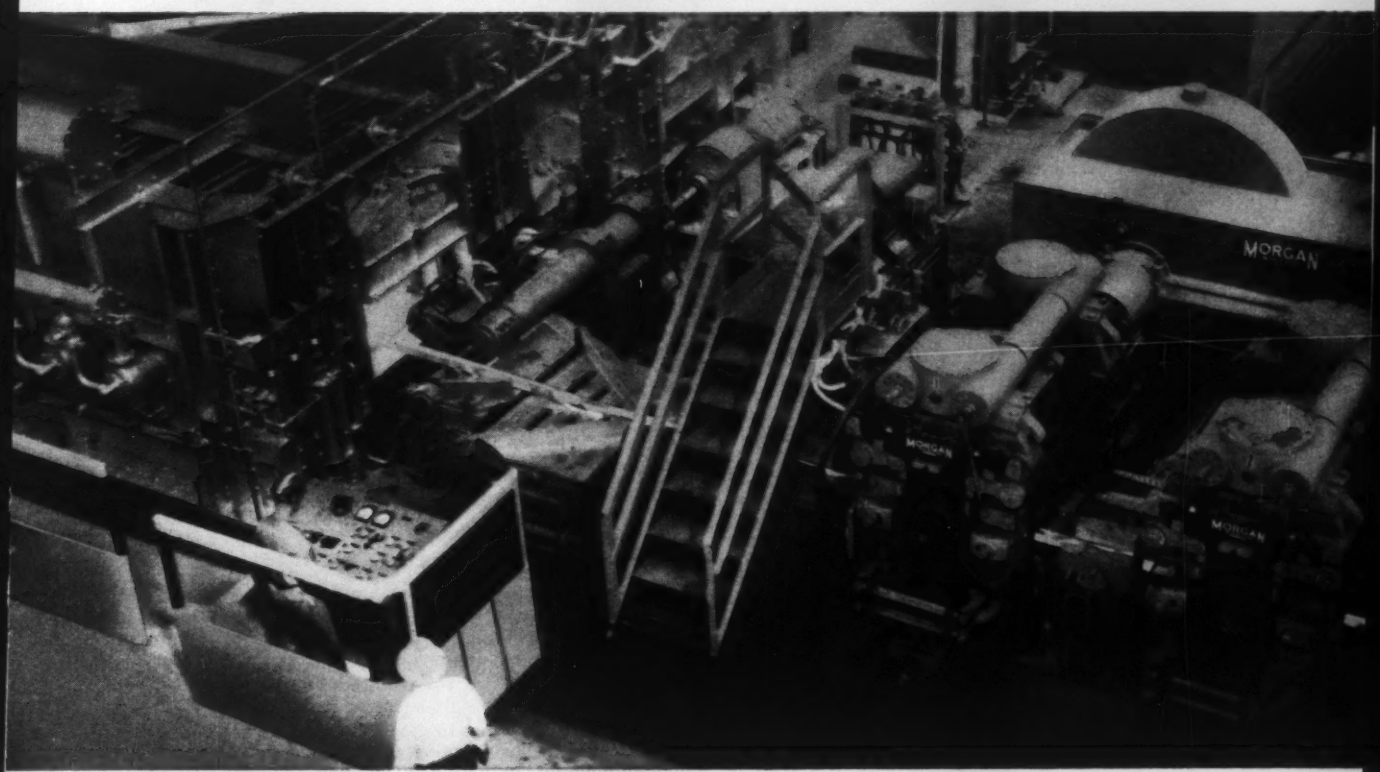
THE VERSATILE MILL WITH MARKETS IN MIND

Morgan Designed Mill for Sheffield has ability to Roll Wide Product Variety



ROUNDS • HEX'S • SQUARES • EQUAL ANGLES • UNEQUAL ANGLES • FLATS • BEVEL SKELP

Now rolling at three times previous production rate, the Morgan-built No. 2 rod mill in the Kansas City plant of Armco Steel Corporation's Sheffield Division was designed to turn out with equal efficiency any shape in the broad range of product demanded by current market trends. This example of Morgan creative engineering has gained world-wide recognition as the fastest 10″, 3-strand rod mill—proving again the operating benefits inherent in Morgan know-how and capabilities, accumulated in over 70 years of rolling mill pioneering.



MORGAN WORCESTER

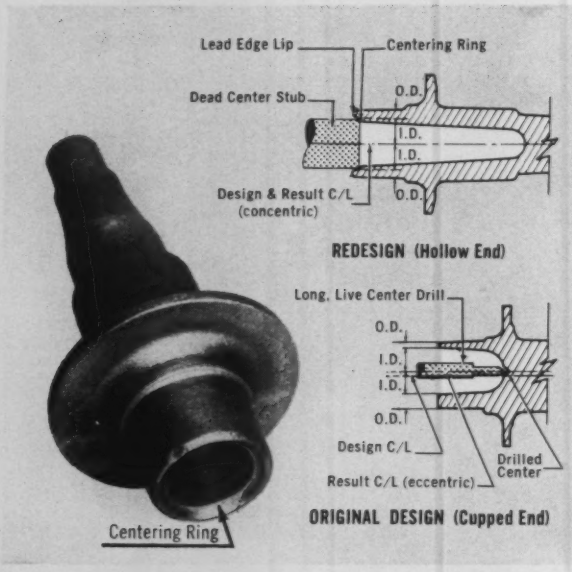
MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS

ROLLING MILLS • MORGOIL BEARINGS • WIRE DRAWING MACHINES • COMBUSTION CONTROLS

Superior Parts at Lowered Cost with This Fresh Approach to Forging

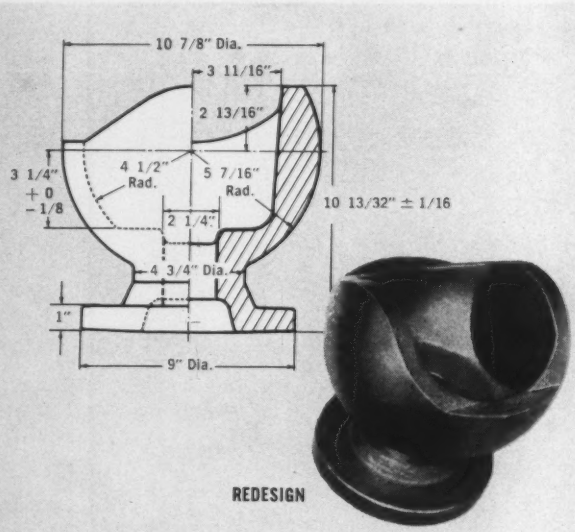
Many parts in use today are better as a result of design refinements suggested by COMMERCIAL's forging experts. Below are examples of COMMERCIAL upset forgings which demonstrate how these design refinements have resulted in superior parts for the OEM at lowered cost. These examples may appear to you as unusual in design—and this is the point...



Forging Redesign . . . Cuts Cost, Eliminates Tool Breakage, Cuts Scrap

Original design of axle spindle forging required chucking on the O. D. to enable center drilling of both ends. Part was held between drilled centers for overall machining. Concentric cupped axle end was center drilled blind with long, live center drill. O.D. and I.D. concentricity was difficult to maintain—causing eccentric drill centers. Result: tool breakage and machining scrap.

COMMERCIAL's redesign calls for a centering ring on inside edge of hollow end, forged without concentricity problem. Lead edge lip protects this important centering ring. The part can now be held for overall machining by a dead center stub engaged in the centering ring. Result: center drilling of open end not required, tool breakage eliminated, no machining rejects, metal savings.



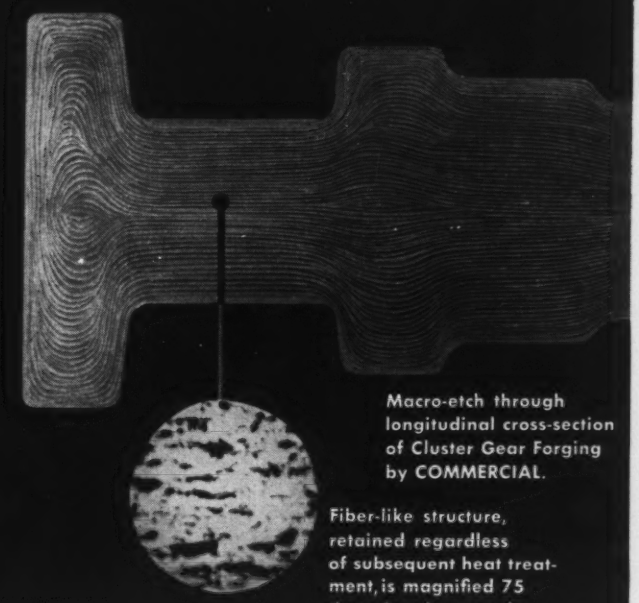
Unusual 80 lb. Forging . . . Reduces Cost, Replaces 95 lb. Casting

Ball joint housing for heavy duty steer and drive mechanism . . . formerly a steel casting. Field failures were traced to hidden metal faults. The housing was unable to withstand shock loadings encountered.

Problem: redesign for required strength—part to be no larger, no heavier, same shape.

Solution: an upset forging of unusual shape—flanged on one end, belled on the other, open at both ends. COMMERCIAL collaborated in the design and produced the part free of hidden metal flaws with sound, tough metal throughout—failures eliminated. Plus . . . weight saving over 15%, saving in machining cost 10%, greater strength-to-weight ratio.

When it's a vital part,



Macro-etch through longitudinal cross-section of Cluster Gear Forging by COMMERCIAL.

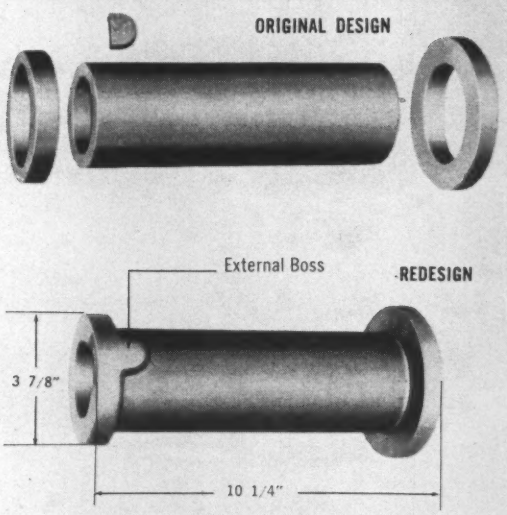
Fiber-like structure, retained regardless of subsequent heat treatment, is magnified 75 times in micro-graph.

Metal Quality Facts

Forgings start with "Forging Quality" rolled steel . . . steel that is closely controlled in its making for the purpose of eliminating defects and obtaining soundness—surface and interior. Such quality steels have been hot worked to obtain maximum development of their potential physical properties. Grain structure has been refined into a fibrous flow in the direction of working.

Mechanical hot forging of "Forging Quality" steel forces the metal in its plastic state to conform to specified shapes and achieves a vast improvement in its "as rolled" metal quality. Forging kneads the metal into a dense mass of strength and toughness and positions it into commercially exact dimensions and shape in all directions.

Upset Forging in closed dies produces by squeeze pressure a "looped" grain flow and permits concentration of grain density at points where the service stresses are calculated to be the greatest. Also, control of the directioning of the inherent fiber-like structure provides for maximum strength of the metal at required stress points. Not only are the properties of the metal improved in all directions but also the metal structure is refined and compressed resulting in a structural uniformity that renders the metal remarkably free from concealed defects.



One Piece Forging . . . Lowers Cost, Eliminates Four Piece Weldment

Blank for hydraulic cylinder outer barrel used to position Nike missile...originally a weldment—a tube, two flanges and a boss.

Problem: cut unit production time to meet crash program schedule, reduce assembly and machining cycle, increase strength-to-weight ratio.

Solution: a difficult upset forging because of external boss. COMMERCIAL tooled and produced the part in one piece to print. Assembly time eliminated, less distortion...improved machining conditions, forged to closer tolerances, uniform metal quality, added tensile and torsional strength due to controlled grain flow, strength-to-weight ratio increased, delivery schedule satisfied.

better make it FORGED

Advantages of Upset Forgings

- *Uniform strength, toughness and high fatigue resistance insure longer, more dependable service life for equipment.*
- *Parts made closer to finished dimensions—cuts scrap, reduces machining and finishing time.*
- *Components can be assembled by simple production methods into complex parts.*
- *Uniform response to heat treatment gives desired physical properties of precise degree.*
- *Higher strength-to-weight ratio obtainable—a vital factor in the design complexity of parts for the future.*

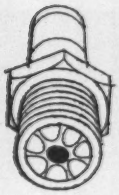
Features of Upset Forging by COMMERCIAL

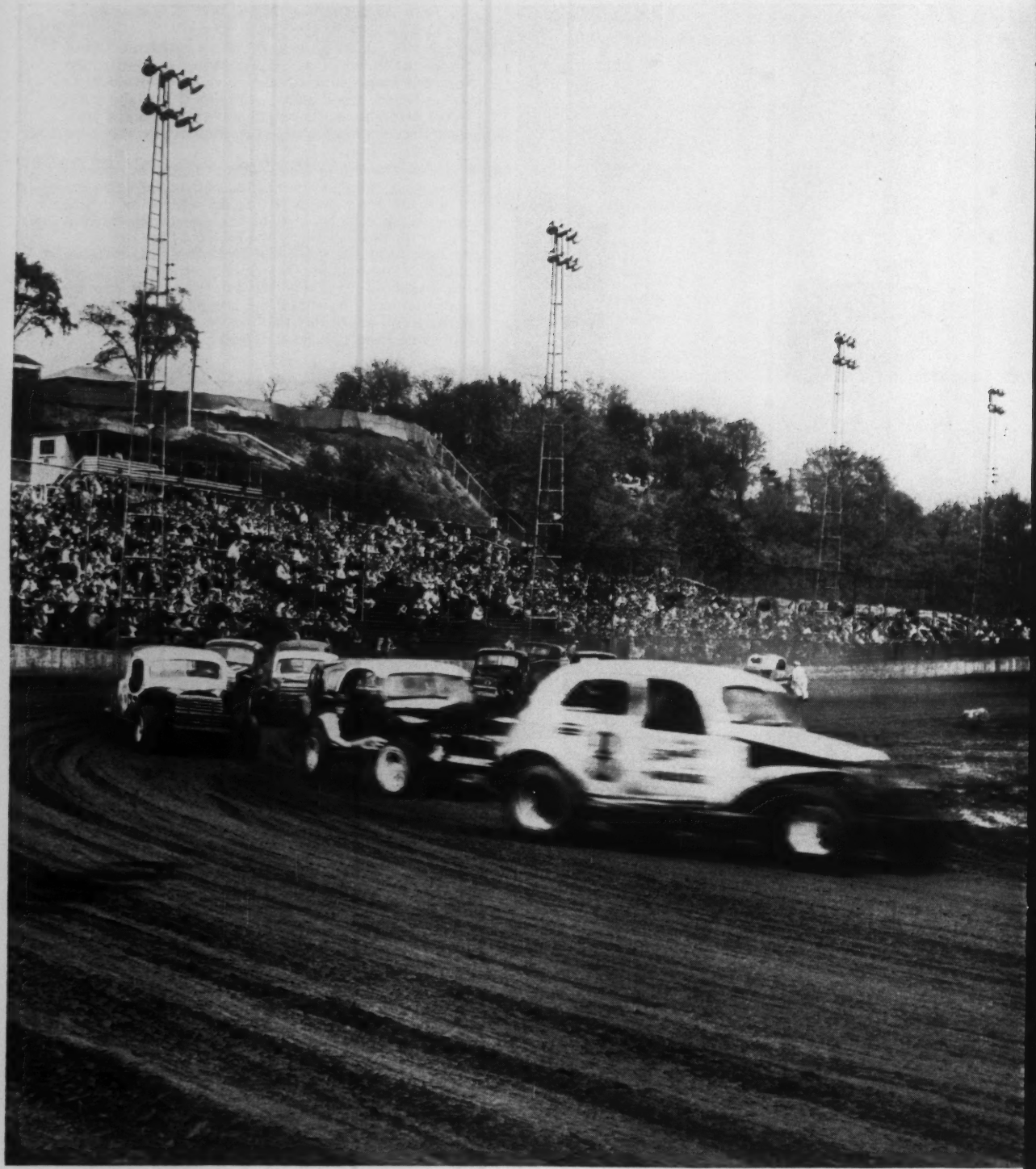
- *Batteries of upsetters from 1½" to 8"—custom or production runs.*
- *Hydra-Jet descaling prior to forging reduces imbedded surface scale.*
- *Magnetic particle depth inspection to detect metal faults before shipment.*
- *"Task Forging" team steeped with experience in producing the unusual upset forging.*

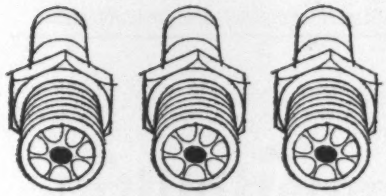
While designs are on the board, call on COMMERCIAL'S "Task Forging" team to collaborate with you—send print or sketch, sample or prototype. Address: Commercial Shearing & Stamping Company, Dept. K-25, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

The Porter Alloyist delivers the right alloy IN THE SPOTS THAT COUNT





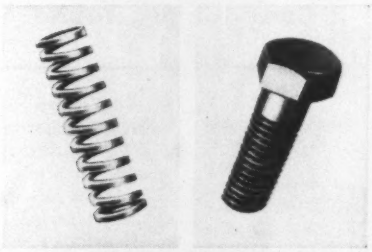


There can be no compromise in performance when there's a track record at stake. That's why the Porter Alloyist recommends special Inconel wire for stock car spark plug electrodes. It delivers high electrical conductivity with maximum resistance to erosion and corrosion by combustion gases.

THE PORTER ALLOYIST IS A SPECIALIST IN A WIDE RANGE OF SPECIAL METALS

Porter's Riverside-Alloy Metal Division is your single reliable source for specialty alloys in 8 basic groups of wire, rod and strip . . . phosphor bronze, nickel silver, cupro nickel, brass, stainless steel, nickel, Monel and Inconel.

Ask for a free copy of "Alloys for Industry" describing our wide range of specialty alloys. Write H. K. Porter Company, Inc., Riverside-Alloy Metal Division, Riverside, N. J. Or contact our sales offices in Hartford, Chicago, East Orange, Atlanta, Cleveland, Detroit, Cincinnati, Los Angeles and Rochester.



PORTER stainless steel, phosphor bronze, brass and other alloys serve in springs for many uses.

PORTER brass, nickel silver, Monel and phosphor bronze hold up under the stresses of cold heading operations.

PORTER

RIVERSIDE-ALLOY METAL DIVISION
H. K. PORTER COMPANY, INC.

(Continued from P. 108)

Signode Steel Strapping Co.—J. F. Beckman and M. C. Carlson, elected vice presidents; A. N. Perry, elected asst. vice president, Sales; Hugh Bunten, elected vice president and secretary.

General Dynamics/Electronics Corp.—T. A. Holdiman, appointed chief of systems controls, Military Products Div.

Republic Steel Corp.—J. W. McClurkin, named asst. superintendent, openhearth dept., Warren, O., plant.

Rust Engineering Co.—J. P. McCloskey, named manager, sales, Pittsburgh office.

Basic Inc.—G. J. Peer, appointed general sales manager.

American Welding & Manufacturing Co.—A. S. Gardiner, named sales representative, Industrial Products Div.

Ajax Magnethermic Corp.—Clifford Amend, appointed metallurgist.

Yuba Consolidated Industries, Inc.—W. E. Dreusike, appointed sales manager, Erectors Div.

American Brake Shoe Co.—J. H. Woodward, Jr., named field engineer, Cincinnati, office, Denison Engineering Div.

LeTourneau-Westinghouse Co.—L. J. Burger, named president.

F. K. Iverson, appointed executive vice president, Coast Metals, Inc.

J. C. Secrest, elected vice president, purchasing, American Motors Corp.

Dow Chemical Co.—G. W. DeKuiper, appointed district sales manager, plastics.

Fairbanks, Morse & Co.—C. W. Batkay, appointed sales manager, International Div.

Stewart - Warner Corp. — A. J. Booth, appointed general manager, Chicago plant, Stewart Die Casting Div.

Denver Fire Clay Co.—Robert Longseth, appointed sales promotion and advertising manager.

McKay Machine Co. — H. D. Allman, appointed manager, manufacturing, Federal-Warco Div.

Control Industries, Inc.—Irving Charm, appointed corporate chief engineer, quality control.

Pittsburgh Steel Co. — R. E. Graham, named asst. director, industrial relations.

Cutler-Hammer—H. E. Johnson, appointed district manager, Buffalo.

Sutton Engineering Co.—W. R. Heck, appointed manager, mechanical equipment sales.

OBITUARIES

E. T. Risan, asst. to the president, Sutton Engineering Co.

V. S. Spears, sales engineer, Wheelabrator Corp.

Here are tips to help you achieve packing-fluid compatibility!

The efficiency, safety and ultimate cost of a hydraulic system is largely dependent on the compatibility of its packings and fluid medium . . . how well they do or do not work together.

Mineral Oils

The above is frequently overlooked when a plant switches from one type of fluid to another. Take *mineral oils*, for example. Three general types are used in hydraulics, and are classified according to their aniline points: high, medium and low.

If, through error, a high aniline oil is used where low aniline oils are specified, rubber seals in the system would shrink and harden. Conversely, "high aniline" rubber seals will swell and soften in low aniline hydraulic oils. Leakage or equipment failure is the result.

To complicate the picture further, mineral oils made to the same specification by different oil manufacturers, using different crudes, will vary in aniline point to the degree that they may cause synthetic rubber seals to either shrink or swell.

Even among the various types of synthetic rubber used for hydraulic seals, the reactions to mineral oils vary. Buna S and Butyl seals, for example, will disintegrate in mineral oil while Buna N, Neoprene, Viton and Thiokol polymers work very well.

Fire-Resistant Fluids

In many hydraulic systems, *mineral oils* are being replaced by modern, synthetic fluids which eliminate fire hazards without affecting hydraulic efficiency.

Three types of fire-resistant fluids are in wide usage and each type requires a *compatible* packing.

The three basic types of synthetic fluids with *recommended* and *maximum recommended* operating temperatures are shown in the box.

Type	Recommended Temperature	Maximum Recommended Temperature
Phosphate Ester	+130°F.	+180°F.
Water-Glycol	120°	150°
Emulsion water-oil	120°	150°

Phosphate Ester fluids and mineral oils have a directly opposite effect on the same rubber seals. Butyl packings which fail miserably in mineral oils, work beautifully with straight Phosphate Ester while Buna N, which works well in mineral oils, is unsuitable for Phosphate Ester. For this reason, changing a system from mineral oil to Phosphate Ester requires a complete and careful flushing and cleaning *as well as a switch in packing materials*, if elastomer packings are used.

For use with these fluids, homogeneous packings should be of Butyl, fabricated packings of Butyl and duck or asbestos and leather packings should be either Wax or Thiokol impregnated.

Water-Glycol fluids are generally compatible with both Buna N and Butyl seals, and with duck or asbestos. However, they do attack leather fibers. Water-Glycols have a pH of 8.5 to 10.5 and leather fibers start to disintegrate at a pH over 8.0

Because of this pH condition, leather packings are not recommended for use with Water-Glycols. Homogeneous packings should be of Buna N and fabricated packings of either asbestos or duck and Buna N.

Emulsion type fluids react much the same as mineral oils do with rubber and leather. In homogeneous and fabricated packings, use Buna N; in leather, use a filler of wax or Thiokol. Never use Emulsion fluids with Butyl.

A Simple Solution

As complex as the subject appears, packing-fluid compatibility in hydraulic systems can be determined with very little trouble. Houghton Packing-Fluid Compatibility Tables will instantly tell you which packings work best with the various types of fluids in general use.

Better yet, Houghton is in a unique position to give you completely unbiased answers to your hydraulic packing-fluid problems, for **Houghton is the only manufacturer who offers you a complete line of both packings and fluids for industrial hydraulic systems.**

FREE! Packing-Fluid Compatibility Tables

For your copy of Houghton's Packing-Fluid Compatibility Table, or for help on any hydraulic packing or fluid problem, call your Houghton representative or write: E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

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First of a Series:

Metalworking's Technological Explosion

Materials for the Future

■ Computer-designed alloys, ductile ceramics, heat-resistant plastics . . . these are just some of the promises held by materials in the 1960's, a period already labeled as the "Decade of Materials."

For the metalworking designer and manufacturer, there will be an endless variety of new materials whether the product be a spaceship, compact car, machine tool or TV receiver.

In charting the future of materials — metals, ceramics, glasses, polymers — certain trends become very apparent.

"One," notes N. E. Promisel, chief materials engineer, Bureau of Naval Weapons, "will be the greater interchangeability of materials."

What now can be made of only a metal may be made of a plastic—and vice versa. A design that calls for a ceramic may specify a glass—and vice versa.

"Composites which combine the best features of all materials will be in greater demand. There will be metal-plastics, glass-plastics, glass-metals and so on. They may be of clad, reinforced, or sandwich concepts. Reinforcing will be in the form of powders, flakes and fibers."

It'll soon be hard to identify the various materials. "In fact," says W. R. Hibbard, manager, metallurgy and ceramics, GE Research Labora-

By C. L. Kobrin,
Metallurgical Editor

tory, "I expect, that by 1970, materials will no longer be classified as metals, ceramics, glasses and polymers. Instead, they will be organized by use—such as structural, nuclear, magnetic, electrical, and optical."

Materials at one time were several steps ahead of the designer. Today, the reverse holds true. Years ago, when a metal was not adequate for a certain application, there was a scramble for the periodic chart. Today, the approach is more sophisticated.

The search may be for a cutting tool that lasts indefinitely. A project may be to reinforce ice for airplanes landing at the South Pole. It may be for materials for a memory or energy-conversion device.

Whatever the goal, the scientist is taking up more and more a fundamental approach. He recognizes that there is still a lot to learn about materials and why they behave as they do during production or in service.

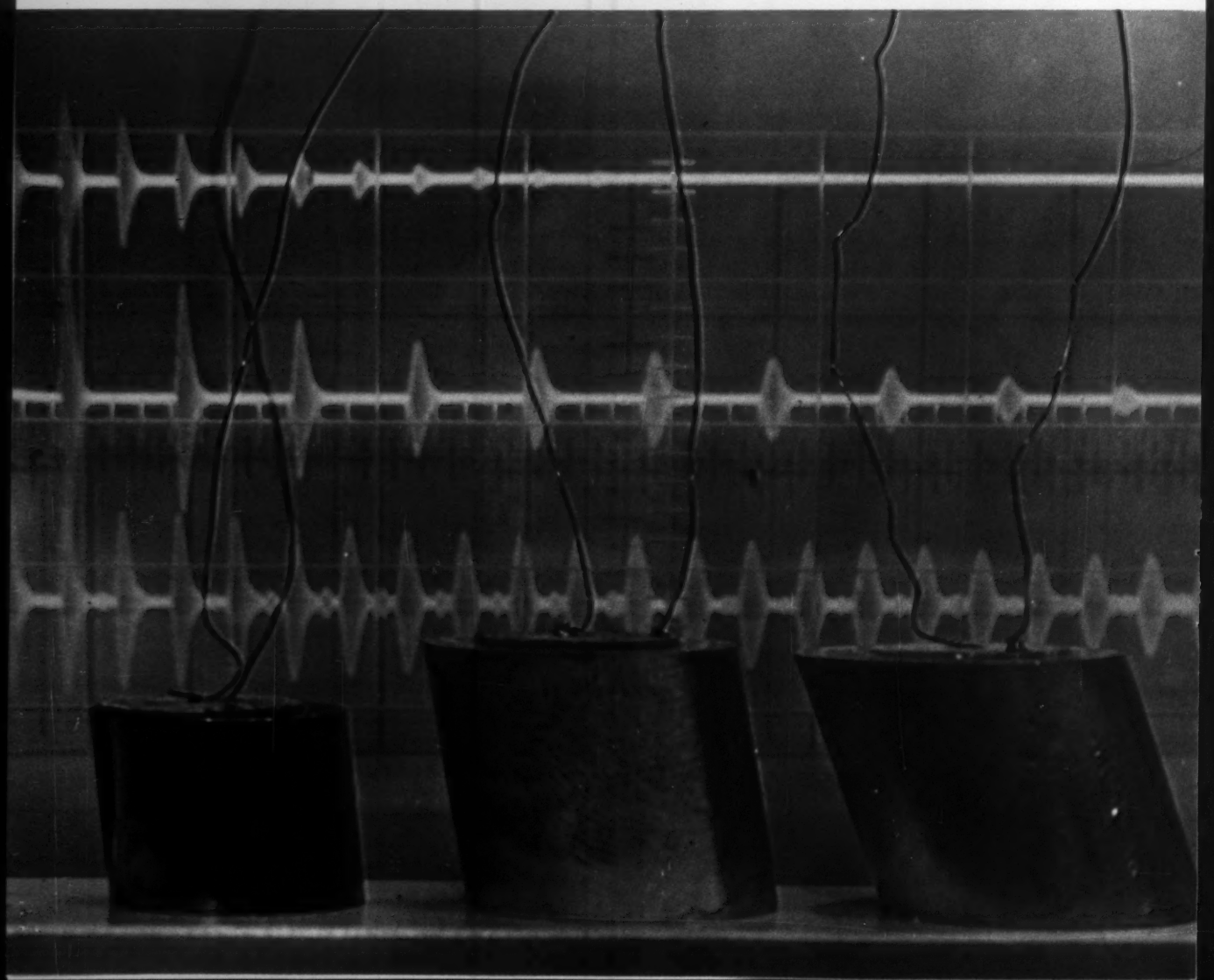
"Science is being applied to all materials on a wide front," says Dr. Hibbard. "And a pattern is taking shape. We are finding that many of the mechanisms that govern metals also hold for ceramics, plastics, and glasses."

This is why the thinking is in terms of a more inclusive science of "materials."

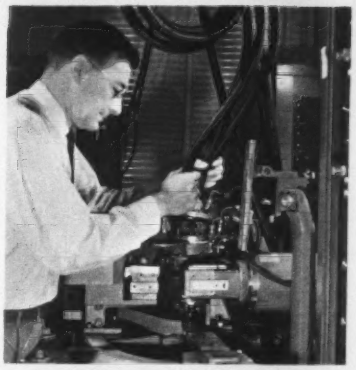
The government, also, is right on top of this trend. In the last year, multimillion-dollar contracts toward the establishment of materials-science centers at eight universities have been awarded. More will follow.

Dr. R. Maddin of the University of Pennsylvania, one of the recipients of a materials-research contract, says,

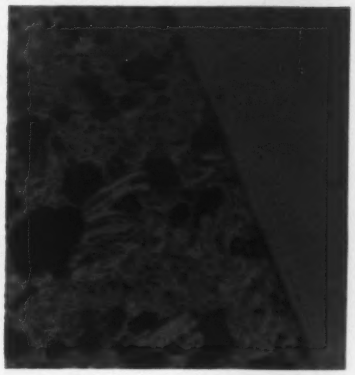
Oscilloscope reveals tell-tale traits of tantalum, copper, and gold during studies at Ford Motor Co.



Illustrating motion of domains in magnetic materials is GE mock-up.



Special Avco RAD camera captures phase changes in materials at 1000° C.



Cross-section reveals oriented structure of GE's pyrolytic graphite.

"We must enlarge our basic knowledge of the relation of structure and properties.

"When we understand interactions between dislocations, and point defects, effects of impurities, the grain-size effect . . . then we'll really know how to improve mechanical properties.

"Combatting corrosion, seizing and galling, bonding problems . . . all will be easier when we understand surface phenomena and thin films."

Tailor-made alloys will be one result. "With the elegant techniques for watching defects and what happens when metals deform, we're beginning to get a basic understanding of the properties of metals," says V. F. Zackay, of Ford Motor Co.'s Scientific Laboratory.

"When sufficient evidence is obtained in the next decade, then metallurgy will become a science.

"Then we'll be able to computer-design alloys—feed the computer data on heat treating and fabrication to get alloys with built-in properties."

There is another reason for the emphasis on "materials." According to Dr. Hibbard, "In many industries the uniqueness of products may depend on the uniqueness of material characteristics. Thus, many companies in the automotive, aircraft, and electrical fields are deeply involved in materials research—not from the standpoint of material category but from the standpoint of use."

Take the automobile industry, for example.

Plastics in today's automobiles make up only a small fraction of the total weight—less than 1 pct. But this figure is expected to double by 1965.

Cost, next to safety, is the prime consideration of the automobile designer. "This is why plastics," says Robert Thomson, manager, metallurgy, GM Technical Center, "constitute the greatest threat to the automotive use of sheet steel and iron castings." (Materials-cost analyses show that the average plastic has gone down in price in the last five years. Steel has gone up.)

Many new plastics with improved strengths, higher operating temperatures, better corrosion resistance are another reason for plastics' expected gains. "Their development is limited only by the ingenuity of the organic chemist," says Dr. Thomson.

The current trend, add Ford engineers, is to design plastics parts to take full advantage of the mechanical properties as well as the physical traits. Result: a functional as well as attractive part.

Next is the use of this new family of "workng plastics" to step into structural applications. Bumpers and car panels are just a few possibilities.

Automakers are taking a closer look at high-strength steels.

Today's autos are built with steels with a maximum tensile strength of 220,000 psi. However, 500,000 psi steels with useful ductility have been produced by Dr. Zackay and his co-workers at Ford. Studies indicate that these steels can be economically fabricated on standard steelmaking facilities.

Called Ausforming, the development is particularly significant because it points up the position taken by most materials experts—that the greatest improvements in materials lie in taking a scientific rather than an empirical approach.

"Theoretically," Dr. Zackay points out, "the strength

With the advent of strong (500,000 psi) steels made by Ford Motor Co.'s Ausform process, precise control of heat treatment becomes of great importance in metallurgical technology.

ceiling for steels is close to 2,000,000 psi. That this strength level can be obtained, research on metal whiskers bears out. This, then, is the target.

"We know," Dr. Zackay continues, "that iron can be hardened by a number of ways: By adding carbon, working, altering the grain size, the martensite transformation."

The thermal-mechanical process of Ausforming combines all these mechanisms.

Scientists are continually adding new dimensions to improve material properties. One is shock loading. Another, the use of super pressure and ultrahigh temperatures has already resulted in man-made diamonds.

The greatest impetus for materials research comes from the demands of the Space Age. The challenge is a fearsome one.

Already well publicized is the problem of making a nose cone capable of withstanding the extreme heats of re-entry—higher than the melting point of most materials.

But the rocket and spaceship designer has other hazards with which to contend. Corrosive fuels, ultracold, high vacuum and cosmic radiation are just a few. And then there's always availability and fabricability.

Metals, by virtue of their strength, ductility, and reliability will continue to be the prime materials in space structures. Here's a rundown on a few of them.

New alloys of tungsten, molybdenum, columbium,

and tantalum will be developed for use in the 2000°-3000°F range with the hope that oxidation and brittleness shortcomings will be solved. There are some encouraging reports that they will.

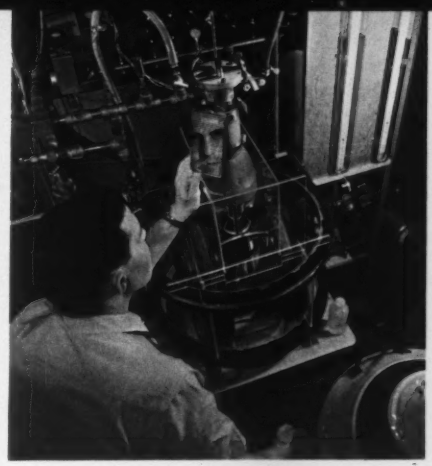
For the 1200°-2000°F range, research will continue on the nickel-base alloys. Dark horses that have entered the picture, though, are vanadium-base and titanium-base aluminum-columbium alloys.

For the below 1200°F range, industry has provided a number of high-strength steels. And it's expected that they will become available in more thicknesses, widths and shapes. As for increasing their strengths, it will likely be via the Ausforming type of approach rather than beefing them up with more alloying elements.

Much has been written about beryllium and its ideal properties for heat sinks and thin sections in danger of buckling. Much has also been written about its availability, extreme brittleness, and toxicity.

Considerable work remains to be done. However, two months ago, a Navy-sponsored research team proved that beryllium is not inherently brittle. As for toxicity, beryllium is now being forged and extruded up to 1000°F—uncoated and without special precautions.

Though the technology of aluminum and magnesium is relatively complete, emphasis on new strengthening mechanisms and protective coatings will extend their usage.



Physicist at GE checks superconducting circuit made of evaporated tin and lead film on glass.

"As service temperatures go up, then we start looking at ceramics, graphite and ablative plastics. For short-time exposures, such as for re-entry nose cones, ablative plastics have proved quite reliable and versatile," says Eraldus Scala, manager, materials research, Avco Corp.

"One of the most interesting materials of the future is pyrolytic graphite. Equally interesting is the way it's

Scientists are tailoring materials with special electrical and magnetic properties. Synthetic quartz, grown by Bell Telephone Laboratories process, has advantages over natural quartz.

made—by vapor decomposition, as a method of fabrication for large complex shapes," says Dr. Scala.

Because it conducts heat in one direction and blocks it in another, pyrolytic graphite provides heat shielding by radiation. It increases in strength with increasing temperature until at 5000°F, when most other materials are molten, it has a strength of 45,000 psi.

Applications will include nose cones, rocket nozzles and a number of industrial uses. However, the recent discovery that pyrolytic graphite can be alloyed opens up whole new fields for this unique material.

That there is no ideal space material is pointed up by the brittleness of pyrolytic graphite.

Thus, designers are looking more and more to composites. Sandwich construction is one of the most thoroughly exploited classes of composite materials. Honeycombs of aluminum, titanium, or stainless steel are used in high-speed aircraft. A composite of metal honeycomb and ceramic holds promise for heat shields.

Attracting a great deal of attention, though, are those composites which combine ductile and brittle materials.

Fine-particle strengthening of a ductile metal (SAP, for example), is one approach. Brittle particles in a matrix of ductile metal is another. One example, tungsten carbide in a cobalt matrix, also has a number of non-space applications: Cutting tools, wire drawing dies, brakelinings.

Ceramics have a number of missile applications. Ceramic fibers, in reinforced plastics, for example, provided thermal insulation to the U. S. astronaut in his first space flight.

The successful growth of ultrahigh-strength metal

Vacuum wetting and spreading furnace aids GM metallurgists in fundamental studies of the interaction between liquid and solid metals. Sample shown is lead-tin alloy melted on iron plaque.

Exploding wire phenomenon, under test at Battelle Memorial Institute sparks study into high strain-rate properties and phase changes in shock-sensitive metals.

Thermionic converter, which powers bank of lights in GE lab, depends on new and unusual materials.

and oxide whiskers is prompting their use as fibrous reinforcement. The recent launching of a Polaris rocket motor, wound with fiber-glass-reinforced plastics, was termed a "revolution in materials engineering."

Glass fibers or sapphire whiskers in aluminum are just two of many other systems under study.

Communications, electronics, computers . . . all depend on new materials and new ways to apply them.

A crucial breakthrough came a number of years ago when solid state scientists learned the importance of carefully controlled impurities—in the parts per billion range—in germanium and silicon. One result of this discovery: The well-known transistor.

Ferrites, garnets, and tunnel diodes are other new words added to the vocabulary of the communications engineer. Yet, the surface has been barely scratched.

"We are just on the threshold of applying the new understanding of the solid state to useful devices," says Morris Tannenbaum, assistant metallurgical director, Bell Telephone Laboratories.

"This is especially true in metallurgy where we are learning to design alloys for electronic and magnetic purposes using the same approach that was so successful with semiconductors—that is, starting with ultrapure metals and 'doping' them with carefully controlled alloying elements."

New developments in magnetism and superconductivity are demanding attention. Magnetic alloys have always been important in communications. However, the new sophisticated computers demand much more from a magnetic material than does a telephone receiver.

Take the twister, for example. Made of a copper wire around which is wound a Permalloy tape, this device stores information based on the direction of magnetization of the tape. But, as with the semiconductor, quality control must be on the atomic scale.

The list of applications for high-strength magnets is a long one. It ranges from field coils in motors and

What happens to materials in outer space? Avco RAD apparatus measures vapor pressures of refractory metals down to 10^{-10} atmospheres.

dynamos to cyclotrons and magnetic bottles for nuclear fusion research.

However, producing strong magnetic fields is often prohibitively costly; large amounts of electrical power are wasted when electromagnets are made of ordinary metals.

The answer to this problem lies at −450°F. At this temperature, certain materials are superconductors. That is, they have zero resistance to electricity.

Superconductors have excited scientists for years. But not until recently have researchers learned to take advantage of their unique properties.

The recent discovery is that electromagnets, made of alloys such as columbium-tin and columbium-zirconium, are superconductors. They can be used to maintain large magnetic fields without consuming any electrical power—so long as they're kept cold.

"In addition to the many possible applications in communications and electronics, this discovery removes one of the major obstacles to the harnessing of nuclear power for peaceful purposes," Dr. Tannenbaum points out.

The obstacle: To create a "magnetic bottle" to contain the high-speed nuclear particles.

Similarly, the "magnetic bottles" that can be produced with these high fields could also be used for magnetohydrodynamics, one of several energy conversion devices now being heavily researched for power generation.

Energy conversion, the conversion of thermal, solar, nuclear, or chemical energy into electrical energy, is another field of technology which depends upon new and unusual materials. Upon them hinges the economic feasibility of these energy devices.

"Availability—any survey of the future of materials should take this vital factor into account," observes J. H. Jackson, manager, metallurgy, Battelle Memorial Institute.

"No matter how superior a material may be for a particular application, a limited ore supply and excessive cost may not justify its use."

"What is needed is greater research and development on ore supply, and metal-extraction and beneficiation processes." The success stories of columbium, titanium, uranium, and iron taconites are cases in point of what can be achieved.

"But take the case of chromium. Here's an element which can not be replaced in stainless steel. Half of what we use in the United States comes from Africa —the raw-material bread basket of the western world.

"And today's international situation emphasizes the need for increased research and development on ore studies."

Processing and fabrication of these "materials for the future" are equally as important as their development. For only then can they be fully exploited.

Refinement of standard techniques, increased emphasis on the more advanced fabrication and joining concepts, more precise instrumentation, more stringent quality control . . . added together, they make up a new dimension in metalworking.

Metalworking's Technological Explosion

This article on Materials for the Future is the first in The IRON AGE's new series on "Metalworking's Technological Explosion." The next subject, power devices, will be covered in the July 27 issue.

Reprints of this article are available as long as the supply lasts. Write Reader Service, The IRON AGE, Chestnut & 56th Sts., Phila. 39, Pa. Ask for Reprint No. 176.

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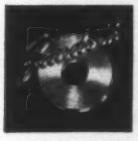

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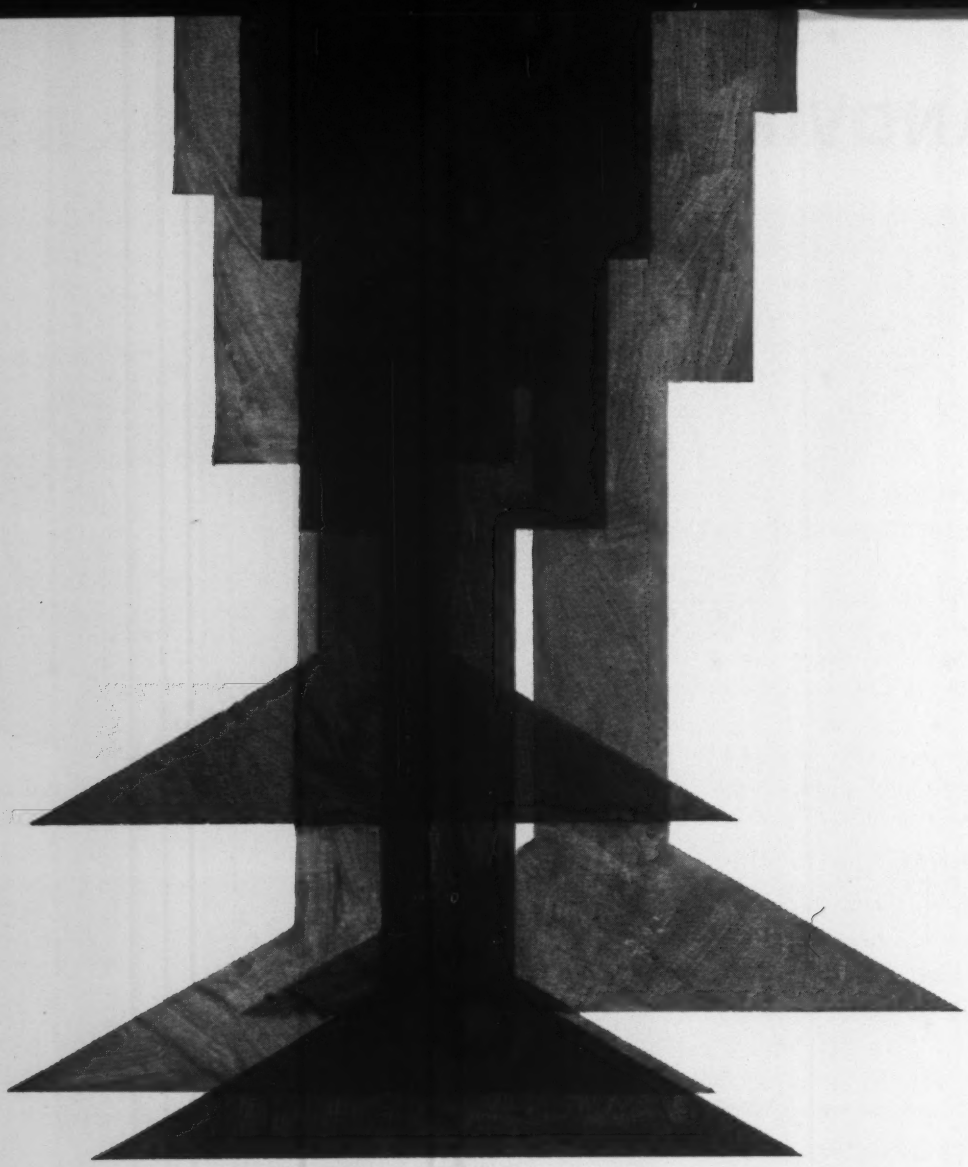

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From steel-making surface down to hearth brick . . . from cold start-up to operating temperatures . . . improved Permanente 84 rammed bottoms and patches have dramatically greater bond strength. ■ The table below shows cold crushing strengths up to six times greater for new Permanente 84—developed from one end of the critical temperature zone to the other. These strengths are achieved without sacrificing refractoriness under load. Permanente 84 goes directly from strong chemical bond to strong ceramic bond. High density is preserved throughout for greater protection against penetration, erosion, impact, and thermal shock. ■ For information and new technical folder about improved Permanente 84—or its companion Permanente 165 ramming mix—contact your Kaiser Refractories Sales Engineer, or write Kaiser Refractories at any of the addresses listed below.

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TEMPERATURE	OLD 84	NEW 84
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1200° F.	1925 psi	10050 psi
1560° F.	1700 psi	10750 psi

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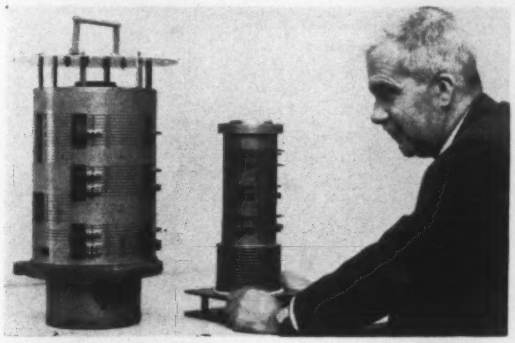
Low-cost memory drums made of stainless steel store up to 286,000 data items. Each of these 4-in. diam drums takes up only one-seventh the area of its aluminum predecessor. The secret to the small drum's memory-storage capacity centers on the stainless alloy's packing density. Also, a higher strength-to-weight ratio insures greater reliability under a wide variety of environments.



OLD AND NEW: Provides stable storage.

Sun-Powered Space Station

Production of a device to harness the rays of the sun for generating space-station power is underway at the Arizona Div. of Goodyear Aircraft Corp. Lightweight highly-reflective materials will form a flexible 44-ft diam solar concentrator. Once in orbit, this concentrator will be inflated into a dished shape. Then a foam plastic will maintain long-term rigidity.

Trailers for Airplanes

Air trailers may soon transport space-missile stages. This new concept hinges on the integration of two air vehicles into one flexible aircraft system. Still in the drawing-board phase, one air trailer has a 160-ft length and a 210-ft wing span. It will carry a 50-ton load, measuring 24 ft in diameter by 90 ft long.

More Long-Range Bombers?

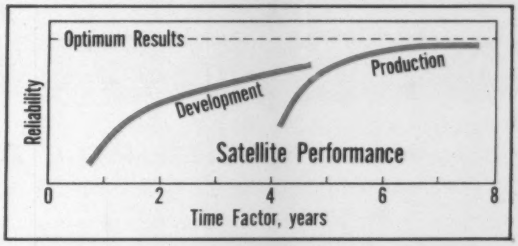
If Congress has its way, the production of long-range piloted bombers will continue. The lawmakers, defying President Kennedy, authorized $525 million for bomber procurement in the fiscal year beginning July 1. The President proposed that bomber output be gradually halted, ending about a year from now. Congress isn't buying the Administration's contention that missiles are ready to take over the deterrent role.

Improves Electrical Flow

Space technology and high-energy research will be advanced by a new superconductor metal that offers no resistance to electrical currents. The newcomer is a cold-worked alloy with three parts columbium and one part zirconium. One use will be superconductor magnets that boast little mass since iron cores aren't needed.

Reliable Spy in the Sky

It takes time to plan, develop and produce a snag-free satellite. Economics also plays a key role. Unless high-reliability levels are achieved, the cost of sustaining satellite systems becomes prohibitive. Present costs per launching exceed $6,000,000. Thus, reliability—based on years of effort—dictates the success or failure of early-warning spy sentinels and other space probes.



Pressure on Pentagon

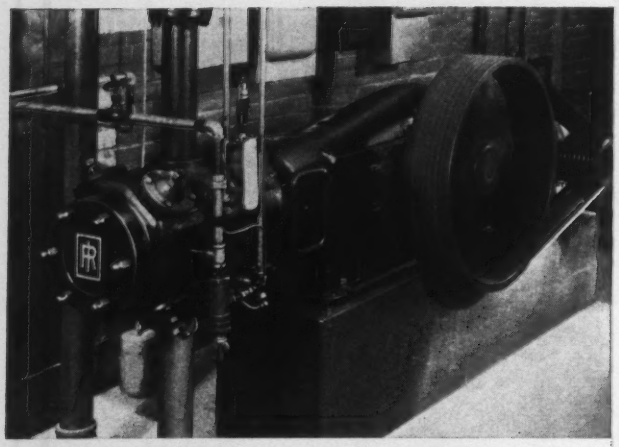
Small contractors should find it easier to sell to Uncle Sam. The Pentagon declares it's "leaning over backward" to give small companies a bigger share in defense procurement. NASA lets 16 pct of its research contracts (dollar volume) to small contractors. But the best the Pentagon has done is only 2.6 pct. Congress suggests the Pentagon try harder to encourage small-company bids by detailing service and product needs.

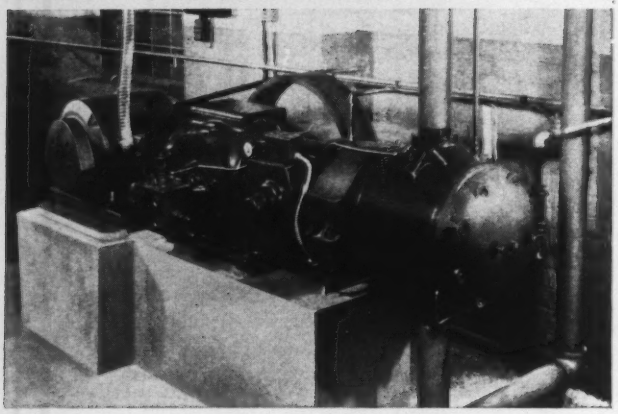
Top: this 20-hp Ingersoll-Rand ES air compressor has served the G. E. Prentice Manufacturing Company for 12 years with no part replacements. Bottom: new 25-hp ESH compressor, added for increased capacity.

IN I-R COMPRESSORS,

TIME TELLS

THE DIFFERENCE





12 years as full-load compressor...

43,560 HOURS

with no parts replaced!

In 1947, the G. E. Prentice Manufacturing Company of Kensington, Conn., installed an Ingersoll-Rand ES compressor to supply the air power for production of metal stampings. Since then, the compressor has been on duty through every shift, and has totalled more than 43,560 hours with no part replacements on valves, cylinder, or running gear!

The Channel Valves were inspected twice a year and cleaned when necessary, but no parts were replaced. The cylinder bore and rings are still in perfect condition.

Recently, a new Ingersoll-Rand ESH compressor was added to take care of increased capacity demand. The ESH is the successor to the ES, and offers many new *extra-value* features, such as full-floating aluminum bearings which never need adjustment, sealed frame which keeps out dirt (the major cause of wear), complete filtered pressure lubrication, and self-adjusting metallic packing. And of course, Ingersoll-Rand's famous air-cushioned Channel Valves with reversible seat plates.

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Computers Talk Shop Language

Until now, programming has been a headache to users of tape-controlled machine tools.

But a new 110-word computer language can help you program complex 3-D shapes almost as easily as you write a letter.

■ A new computer language broadens the use of numerically-controlled machine tools. It's hailed as the missing link in automating the production of complex parts.

Complete Control—Called Autoprompt, the newcomer generates all the tool paths needed to mill any 3-D surface. Each tool path, produced by an automatically-programmed computer, takes the form of thousands of detailed numerical instructions.

All the user provides is a description of the part, tool sizes, tolerances and general machining instructions. He uses the Autoprompt language to feed this data to a computer. The new computer language, developed by the Data Processing Div., International Business Machines Corp., White Plains, N. Y., closely follows English usage.

By simplifying and reducing the human effort needed to program numerically-controlled machine tools, Autoprompt opens the door to limited-run production of very complex 3-D shapes.

Earlier this month, Autoprompt proved itself on its first practical shop job. The test run centered on a helicopter's gearbox cover.

Proof Positive—This work was done at the Research Laboratories of United Aircraft Corp., East Hartford, Conn. Machining took place on a Pratt & Whitney Numeric-Keller, a tape-controlled continuous-path milling machine.

From a blueprint, only 180 one-line statements in the Autoprompt language were written to describe the part completely. Then a solid-state IBM computer used this data to generate 8000 tool-path instructions. It spelled out every tool motion needed to machine the part.

REDUCES LEAD TIME: Numerically-controlled machine cuts surface of a helicopter's gearbox cover. With a new English-like computer language, this complex part was produced in only one-sixth the normal lead time.

All of the computer's instructions were punched on a control tape. Using this tape, the milling machine finished the part in about one-fourth the time previously required to mill the same gearbox-cover model.

Ready to Mill—Lead-time savings are even more impressive. To produce the part by conventional methods it takes three months from blueprint to production stages. With Autoprompt, equally complex parts can be put into production in two weeks. This is only one-sixth the normal lead time.

W. C. Hume, president of IBM's Data Processing Div., reports: "The use of Autoprompt will greatly expand the effectiveness of numerical controls in many production areas."

Short and Simple—The concise English-like language allows the programmer to describe all part surfaces in standard shop terms. It also

SIMPLIFIED LANGUAGE: S. M. Matsa (right), Autoprompt's chief developer, and Dr. P. H. Sterbenz, manager of IBM's Mathematics and Applications Dept., study engineering print of a helicopter's gearbox cover.

FAST ACTION: Autoprompt automatically generates rough- or finish-tool paths while maintaining tolerances of a few millionths of an inch.

lets him work directly from an engineering print. There are 110 words in the Autoprompt vocabulary. A great deal of built-in latitude makes it easy to assemble sentences and paragraphs.

For example, the programmer might use the following statement to define a bowl-shaped surface:

Bowl = Sphere, inside/center
(0, 0, 0) Radius (1.75)

This statement tells the Autoprompt program all it needs to know about the bowl-shaped surface. Other statements describe the relationship of the bowl to other part surfaces.

The language contains words that describe shapes and surfaces. It also contains words that designate the relationship between surfaces.

Handwritten Code—Using a coding sheet, the programmer writes a brief description of all part surfaces. Then, these descriptions are punched into cards. The cards feed into a computer. Under control of the Autoprompt program, the computer plots all tool-travel paths.

The computer records the tool paths generated by Autoprompt on magnetic tape. If required, the taped signals are converted to perforated tape or other media for input to a machine director. The director, in turn, controls the operation of the machine tool.

Autoprompt's diagnostic abilities enable the computer to pinpoint many types of errors which occur in the part description. For further verification, the computer prints a list of tool-position coordinates.

Cost is no problem. Autoprompt programs, programming manuals and operating instructions for the IBM 704, 709 and 7090 data-processing systems are available without charge from Data Processing Div.

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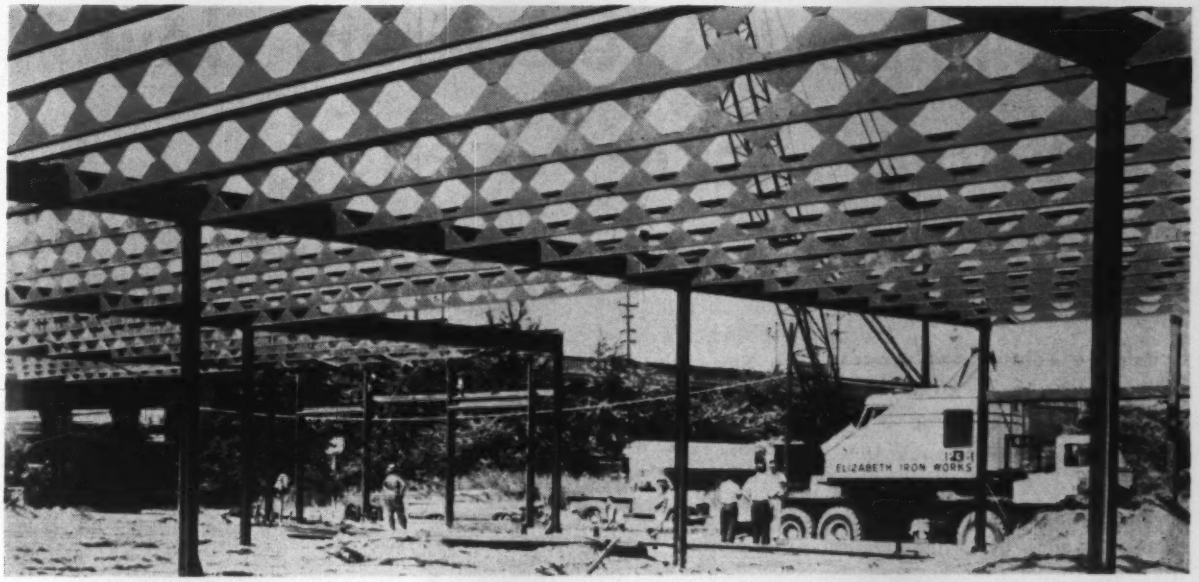


EASY INSTALLATION: Joist-like structural beams speed construction of a New Jersey warehouse. Fabricated from standard I-beams by Elizabeth Iron Works, their use results in installation savings of 30-50 pct.

Do Open-Web Beams Compete?

Joist-like steel beams boast great strength. They're also lightweight. But all too often high cost rules out their use.

Now, open webs are worth another look. A simple fabricating method slashes their cost.

■ Any cost-conscious builder knows that hand labor is expensive. This is the big drawback with joist-like structural beams. Tedious burning methods boost production overhead. This ups their price. Despite promising advantages, they've been wallflowers.

However, a relatively-new fabricating technique may change this picture. It consists of a stamping or punching operation. The savings in production labor give open-web beams a fighting chance.

Elizabeth Iron Works, Elizabeth, N. J., engineers, fabricators and erectors of structural steel products, developed the process. Patents are on the way. With the new method, the company fabricates beams for spans up to 80 ft long.

How It's Done—In converting a structural beam, Elizabeth Iron bisects it lengthwise in a serrated line. A 1000-ton press makes the cut in a few seconds. Then, the two sections are joined by welding the flat ends of the serrations.

This deepens the beam and creates a series of diamond-shaped openings through its entire length. More than appearance is changed. The converted beam is lighter and stronger than the rolled section it came from.

A good example is a lightweight 14-in. structural beam made by the Jones & Laughlin Steel Corp. in Pittsburgh. It weighs 17.2 lb per ft and carries a 300-lb uniform load on a 30-ft span. Let's see what happens when it's converted to an open-web beam.

The Result—After fabrication, depth increases to 21 in.; but weight goes down to 16 lb per ft. Despite the weight decrease, load-carrying capacity soars. The altered beam supports a uniform load of 446 lb per ft. This amounts to a 50-pct increase in strength.

As a result, each square foot of roof needs only 2½ lb of steel. Final cost is the payoff. On an in-place basis, the new beams are moneysavers.

In the Running—Another factor to consider is ease of installation. Complete shop fabrication and the beam's rigidity cut time on the job. This yields additional savings. For instance, steel for a 30,000-sq ft New Jersey warehouse went up in three days. In another case, the design for a large shopping center was altered to include joist-like steel beams. The result was a $15,000 saving.

Also, the open-web configuration eases the designer's problems. Utility conduits fit through the diamond-shaped web openings. Thus, conduit runs have flexibility. Changes cost less money and take less time.

Cold Impact Alters Grain Flow To Boost Socket Strength

Socket wrenches are mighty handy tools. Too often, shop crews take them for granted.

Using a cold-impact process, one manufacturer holds tolerances of ±0.002 in. on a new line of superstrength sockets.

■ A cold-impact extrusion process transforms slugs of medium-carbon steel into socket wrenches at J. H. Williams & Co., Buffalo. As each steel slug is impacted, it's cold worked inside the die cavity. Flowing up around the punch, the slug forms ratchet-drive and nut openings.

No Internal Stresses—Mechanical properties get a boost as the grain flow follows the punch contours. Thus the impact action adds strength and toughness to every socket, especially at abrupt changes in cross section.

The concentricity of all thin-walled dimensions is held to ±0.002 in. Equally-close tolerances are held across the flats on the double-hex sockets. End result is slack-free seating on nuts and bolt heads. These tight fits insure longer socket life and greater safety.

Heretofore, Williams' sockets were made on screw machines from standard bar stock. However, machining interrupts the steel bars' straight grain flow. As a result, machined sockets are weakest at contour-change points.

The new extrusion process starts with short slugs of 50B44 medium-carbon steel. A preforming or coining press brings each slug down to a fixed size and shape. This preliminary cold working serves as the first step in spheroidizing the slugs.

Fine-Grain Structure — Moving into a heat-treat room, the shaped slugs undergo several spheroidize-anneal cycles. These heat-treat cycles alter the slugs' microstructure by breaking down the grain size.

Fine grains make metal displacement easier. And they reduce the chances of fracture under impacting loads. Also, from a finished-product point of view a fine-grain structure yields longer tool life.

After heat treat, sand blasting removes all scale and other surface impurities. Then the slugs receive a coating of phosphates and neutralizers, topped with a high film-strength lubricant. This composite coating eliminates metal-to-metal contact.

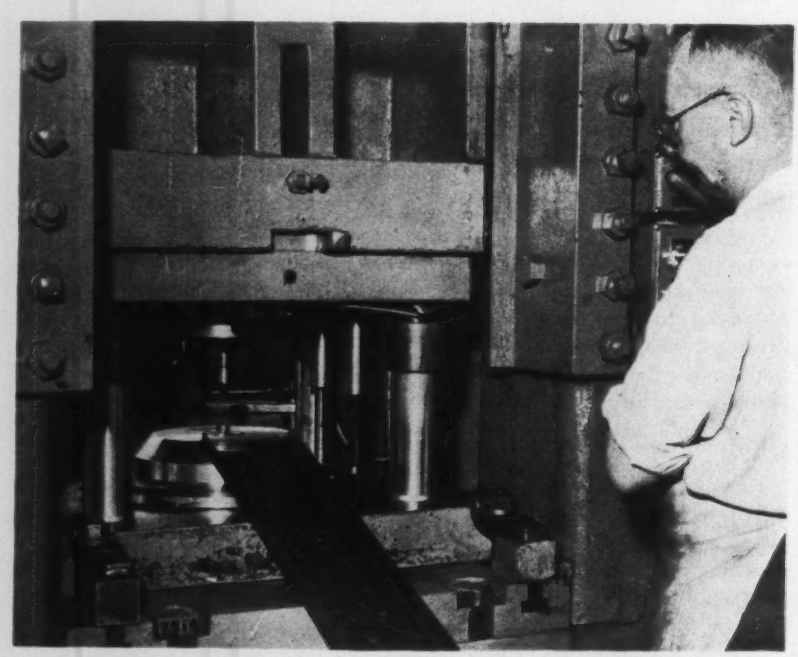
Ready to Shape—After they're lubricated, the slugs enter the extrusion press. Inside the press, dual punches transform each slug into a shaped socket.

A double-hex punch shapes the nut opening; then a ½-in. square punch forms the ratchet-drive hole. Only a thin web separates these impact-formed openings.

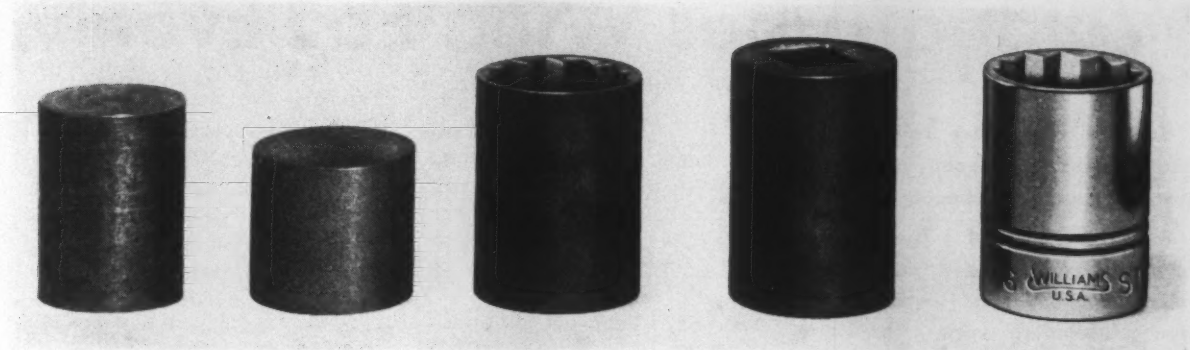
From this stage on, each socket needs only minor machining. First, the web is drilled out. Then the double-hex and square-end holes are faced and chamfered. Ball recesses are cut on each inside wall. These recesses handle the various driver units.

Next, a machinist cuts two grooves in the exterior surface of every socket. These grooves provide a firm grip for easy detachment from the drivers.

Final Heat Treat—Every socket



PRODUCTION SETUP: Operator checks tool alignment and extrusion pressure before starting the press. Phosphate coating on the steel slugs eliminates metal-to-metal contact. A double-hex punch shapes the nut opening; then a ½-in. square punch extrudes the ratchet-drive hole.



FIVE STAGES: One-inch diameter steel bar becomes 1.230-in. diam slug, after preforming. The socket begins to take shape as a double-hex punch extrudes the nut opening. After a square punch forms the driver opening, the socket reaches its final length. Machined grooves in plated socket speed disassembly.

is then stamped to code its size and stock number. After machining and stamping, the sockets receive a follow-up heat treat and quench. A series of salt baths relieves all internal stresses and restores the metal's original hardness.

These salt baths play a vital role. They control the relationship of hardness to toughness without any decarburization or distortion problems.

Another sand-blasting operation follows final heat treating. Then centerless grinders produce a high polish that retains the original concentricity.

Finally a nickel-chrome plating is applied to the polished sockets. Plating takes place in a continuous automated line. Electrical instruments insure constant timing and exact temperatures.

Resists Corrosion—The chemistry of the salt-bath solutions must be constantly checked. But vigilance pays off. Uniform deposits of nickel and chrome provide non-peeling surfaces that resist corrosion.

W. O. Gaudy, Williams' Plant and Product Engineer, says the advantages of cold-extruded sockets can be summed up quite easily. He cites a savings in raw material through scrap reduction.

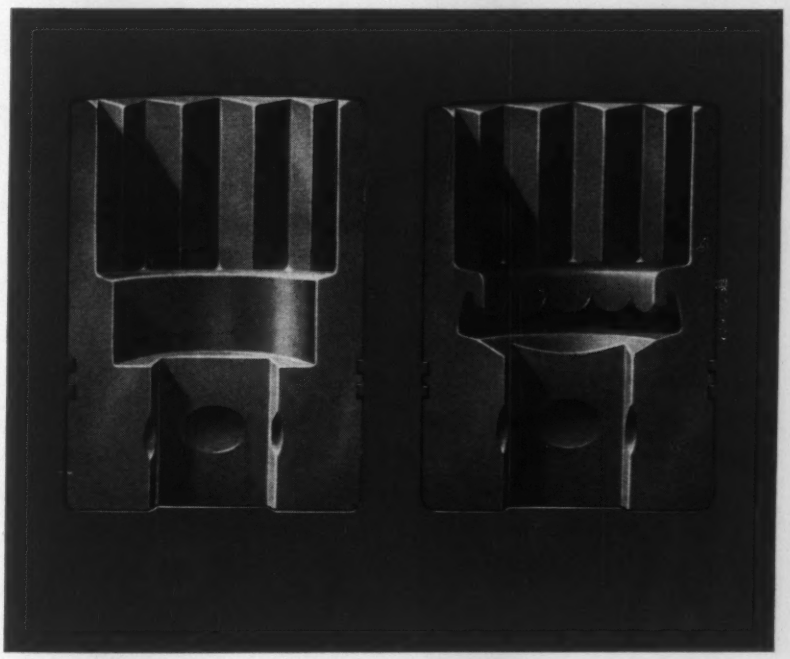
"Virtually every ounce of metal in the original slug is present in the final product," says Mr. Gaudy. "Material savings are expected to range from 40-60 pct over conventional manufacturing methods."

Various Models—Exact savings in materials hinge on the various socket types. The three main types of sockets made at the Buffalo plant are regular double-hex, extra-deep and spark-plug models.

Another advantage centers on the physical properties of the cold-formed sockets. Extruded sockets are stronger than the machined hand tools because the metal flow follows the extruded contours.

Mr. Gaudy points to closer tolerances as a third big advantage. "Accurate tool design holds tolerances of ± 0.002 in." These tolerances, Mr. Gaudy states, "are far more critical than those held by our previous manufacturing methods."

The company is now trying to improve the preformed slug shape in order to increase tool life even further. Tests are also being run on other less costly materials.



LITTLE WASTE: Extruded socket (left) requires only follow-up machining. Machining operations on the other socket interrupt grain flow.

Welded Tubes Wind Foil Evenly

To obtain mar-free foil, emphasis must be placed at the starting point—the spool.

Resistance-welded tubing offers the rigidity and concentricity that's a must for precision foil-winding work.

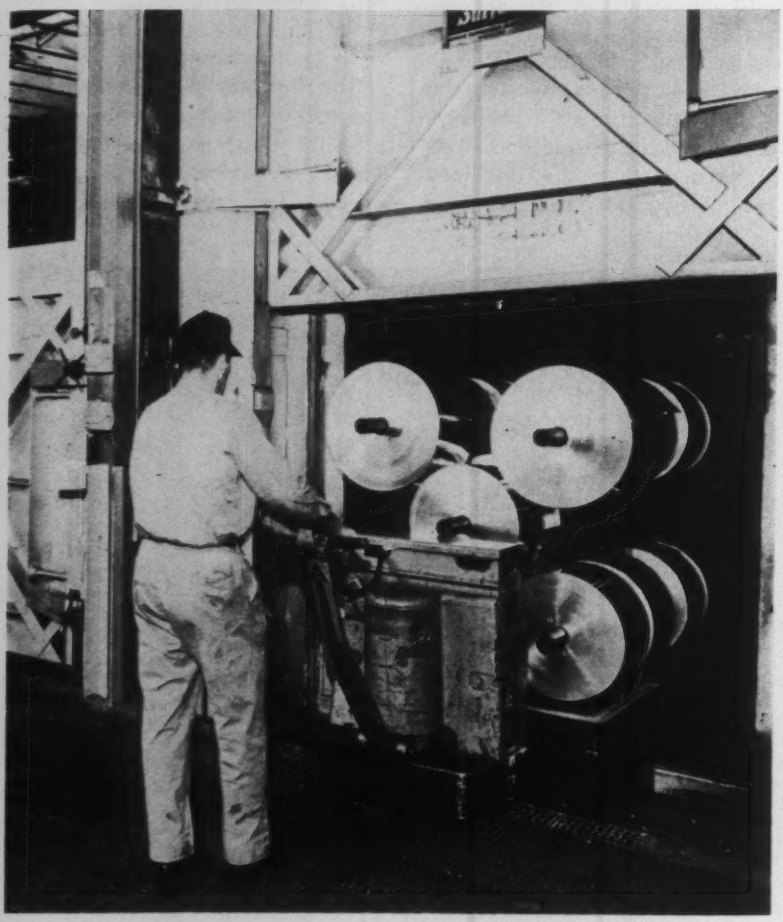
■ Winding thin-sheet stock on a spool correctly is tougher than it may seem. The first few layers tell the story. If the metal's edges hang out, then the ends of the spool won't roll evenly. Irregular edges wrinkle the finished stock and make it worthless.

In winding aluminum foil, the core must be concentric to obtain even winding. Since foil is wound and unwound at speeds ranging from 900-1250 fpm any unbalance causes chatter. Core chatter also mars the foil and leads to its rejection.

Anaconda Aluminum Co., Louisville, winds its foil on resistance welded tubes. The company feels that welded-tube cores offer the best means of controlling wall thickness and runout. These two factors for the most part affect the core's concentricity.

First Impressions — Surface appearance is important in marketing aluminum foils. Most fine-grade foils serve in specialized packaging and costly printing work. Anaconda sells its foils to converters who further process this flexible material.

Finished foils end up as soap wrappers, overwraps for frozen foods, labels, color-embossed paper stock and 0.00025-in. laminated stock for cigarette packs. Foil also finds use in building honeycomb structures for aircraft and marine products. Other uses center on air filters and electromagnetic coil windings.



GOOD SUPPORT: With all weight resting entirely on the cores, the foil is annealed at 800°F. Packaged in special boxes, it's shipped to users.

Core Control — Steel tubing comes to the company's warehouse in 13-20 ft lengths. Cut-off machines snip the lengths to meet the customer's needs. All winding cores are then notched on a punch press to fit each user's winding spindles.

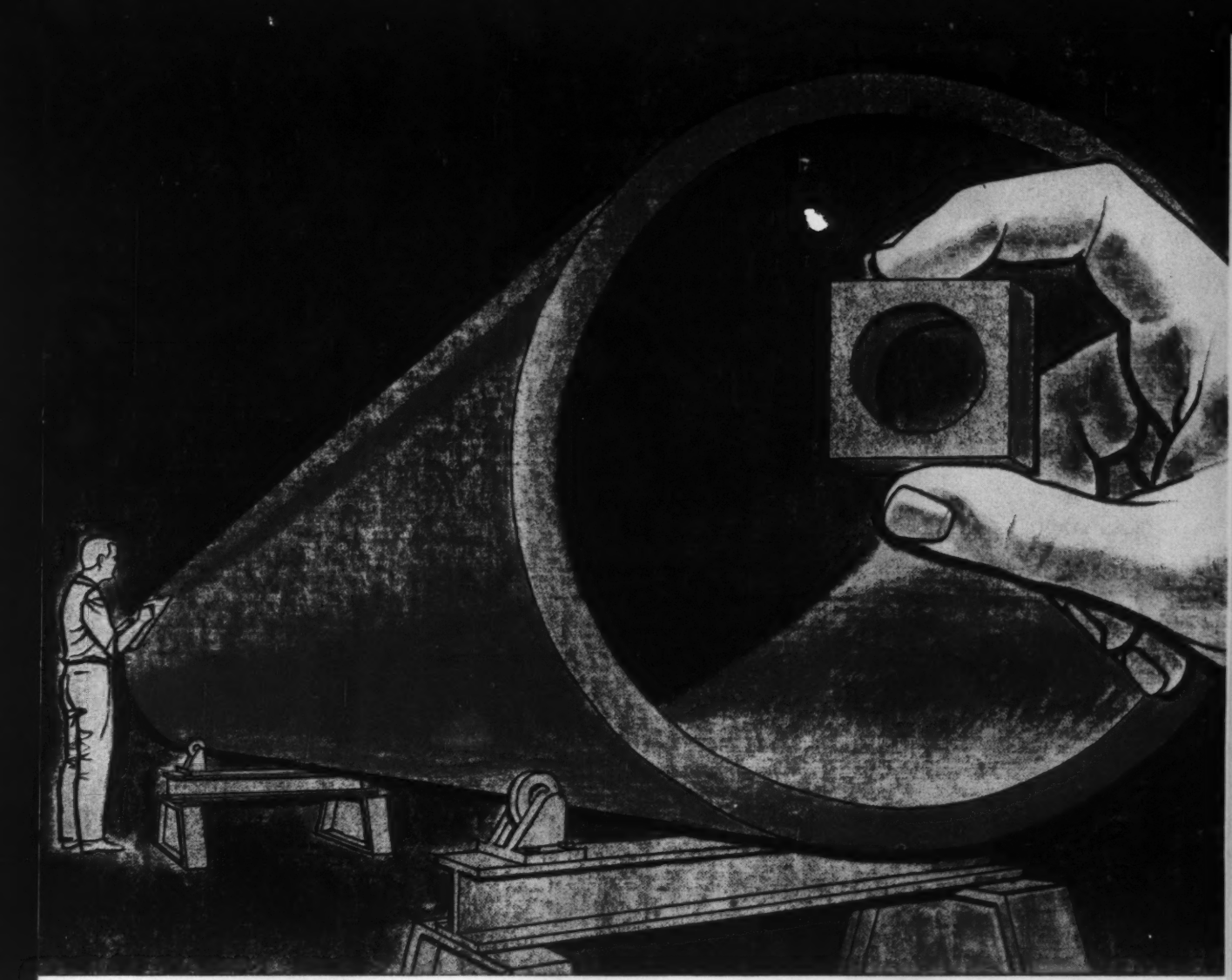
Anaconda's core suppliers have their own methods of manufacture and testing. However, several key points are common to all.

Coiled flat stock feeds continuously into the tube mill. This stock passes through driving rolls into a series of forming rolls which gradually close into a concentric diameter. Butted edges are welded together to form a continuous tube wall.

Double Disks—The welding unit uses a pair of copper-alloy disks as electrodes. As the tubing passes under these paired electrodes, side rolls press the heated edges together. A high-amperage low-voltage current passes between the disks. Moving across the butted edges, this current completes the weld.

Pressure from the side rolls extrudes a small amount of metal in the weld zone. Cutting tools plane off the outer flash while it's still white hot.

Since finished cores must fit oversized blocks, the inside welding flash is held ± 0.005 in. This is done with a cutting tool shaped to the contour of the tube.



From the largest to the smallest you'll save money with Shenango Centrifugal castings

From tiny liners and bushings to the largest sleeves, rings and rolls, you'll find that ferrous or non-ferrous symmetrical parts will be cleaner, denser and more uniform if they are centrifugally cast in Shenango's modern foundry. This means you'll save money. There will be less metal wasted, less machining time, fewer rejects and longer product life than would be true with ordinary casting methods. And because Shenango operates one of the biggest and most efficient centrifugal foundries and machine shops in the country, your largest orders will be filled quickly and exactly to specification. Write for literature.

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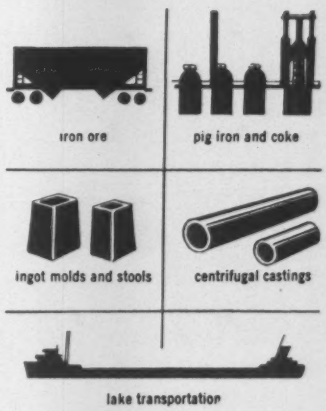

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New Materials and Components

Advanced Systems Create "Total Quality Control"

In the competitive struggle between cost and quality, today's quality-control practices often amplify the problem. Costs soar, while quality improvement only creeps upward. However, recent experience shows that systematic programs to automate quality control actually slash final costs. A new information and test-systems concept makes this path to "total quality control" practical. To do this, these systems must offset initial cost by dramatically upgrading product quality. Here's how this objective is met. Advanced electronic devices prevent, rather than just reject, failures in the product. By doing this quickly enough to outpace the dynamics of a changing process, they allow the user to detect trends toward failure and correct them before scrap is on hand. In other words, a total program gathers and summarizes data, makes decisions, and starts corrective action. (General Electric Co.)

For more data circle No. 25 on postcard, p. 157

Sliding-Gate Valve Accurately Controls Pressure

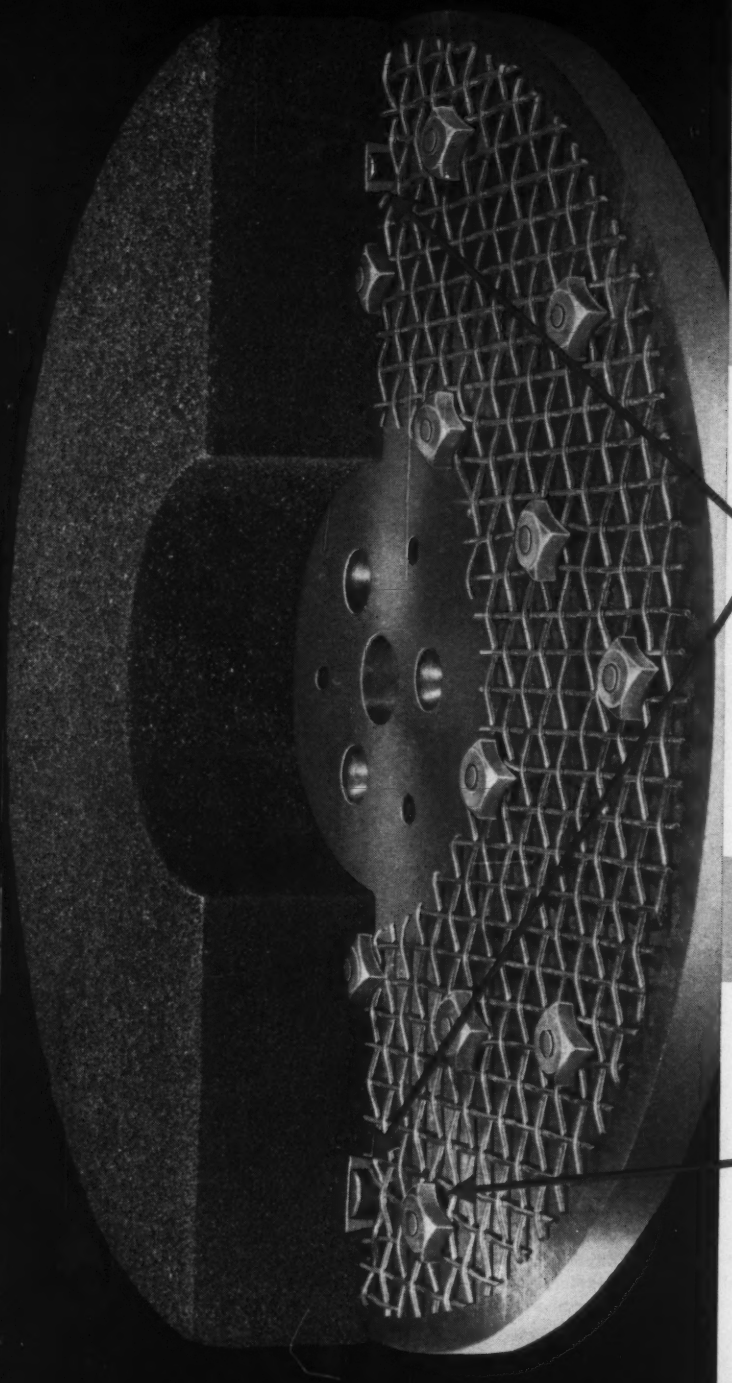
Here's an extra-sensitive pressure regulator that needs no external power source. It operates on the sliding-gate principle. The gate not only closes the orifices; it also overlaps 1/32 in. when it's shut. These contacting surfaces are finished to extreme flatness. This ensures tight shut-off. In addition, upstream pressure pushes against the seat to help seal it. The sliding gate slices across the flow stream in its up and down motion. Thus, the mechanism is a true balanced valve. Gate and plate are in constant contact with each other. As the valve modulates, the up and down motion of the gate makes the seat self-cleaning and self-lapping. Also, straight-through flow cuts turbulence. (OPW Jordan Corp.)

For more data circle No. 26 on postcard, p. 157

Numerical Control Corrects For Off-Size Tools

Now, a numerical contouring-control unit boasts an optional cutter-compensation system. It superimposes a secondary signal on the machine's servo-drive command signals. In this way, each axis receives a proportional correction signal. This signal produces a normal offset, regardless of the cutter-path direction or curvature. With the new control on the job, cutting tools may vary up to 0.050 in. from the programmed diameter. This lets the machine operator use re-ground tools. Or, he can make rough and finish cuts with the same tool and the same tape. It is easy to use because dual controls mount on the operator's panel. With them, he indicates the difference between actual and programmed cutter size and the compensation direction. (Bendix Corp.)

For more data circle No. 27 on postcard, p. 157



Gardner disc features add safety... improve accuracy

Gardner TRU-LOK® disc mounting
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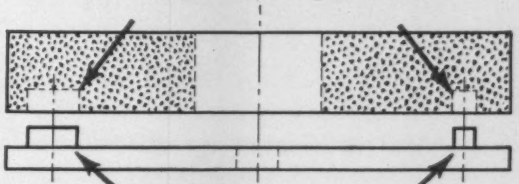

Proper centering of disc on steel wheel assured by Tru-Lok.

Greater accuracy—Tru-Lok eliminates run-out and vibration caused by off center mounting.

Gardner WIRE-LOKT® construction
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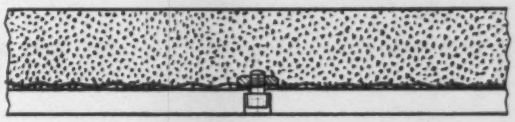

Full value—the entire rated thickness of the abrasive is usable.

Safety—heavy, imbedded steel mesh assures maximum safety.

Call the man who can give you the most in practical, cost saving help with your flat surface grinding . . . your Gardner Abrasives Specialist.

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abrasive discs

BELOIT, WISCONSIN

GE range panels direct-on enameled with new Bethnamel sheets

85-90 pct acceptability on first fire • Boiling, fishscaling no problem

At its huge Range Division, Appliance Park, Louisville, Kentucky, General Electric is now using Bethnamel enameling steel in direct-on enameling of exposed front panels for 30-inch ranges.

DIRECT-ON PROVES SUPERIOR, LESS COSTLY

In producing 400 of these panels per day, General Electric has found commercial-quality, 22-ga Bethnamel sheets entirely satisfactory for the draw involved. Of vastly greater importance, GE has concluded that direct-coated Bethnamel is giving superior results, and substantially cutting costs.

They use the same titania-opacified enamel on the Bethnamel sheets that they use as a cover coat in their two-coat process. As one engineer says, "This enables us to change from two-coat to one-coat operation without missing a hanger on the spray-booth conveyor!"

NO BOILING, FISHSCALING; ADHERENCE SUPERB

Using the PEI standard adherence test impressions, GE has found no loss of enamel in the test area of single-coated Bethnamel. Surface abrasion and acid resistance of the cover coat have proved to be unaffected by the absence of a ground coat. Boiling and fishscaling have not even entered the picture. Bethnamel parts have rung up a record of 85-90 pct acceptability on first fire; and those parts which need reworking are easier to rework because no ground-coat patch is necessary.

BETHNAMEL COSTS NO MORE

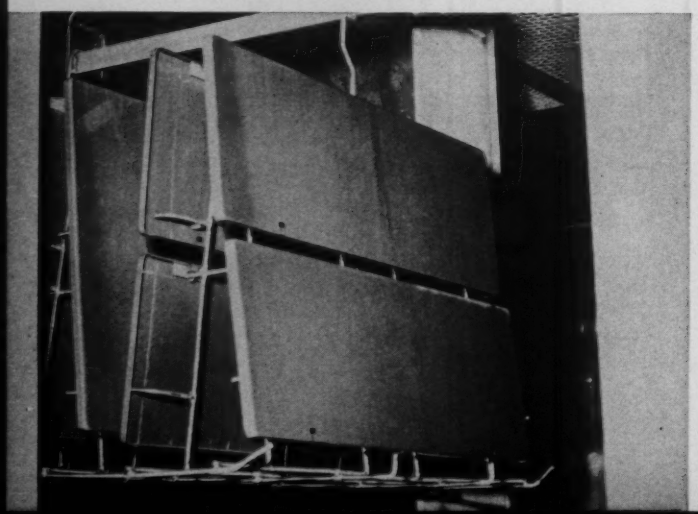
All these and other Bethnamel advantages can be yours, at a cost no higher than that of ordinary enameling iron. For further details, write to the address below, Room 1041, and ask for Folder 734.

Steel *for Strength ... Economy ... Versatility*

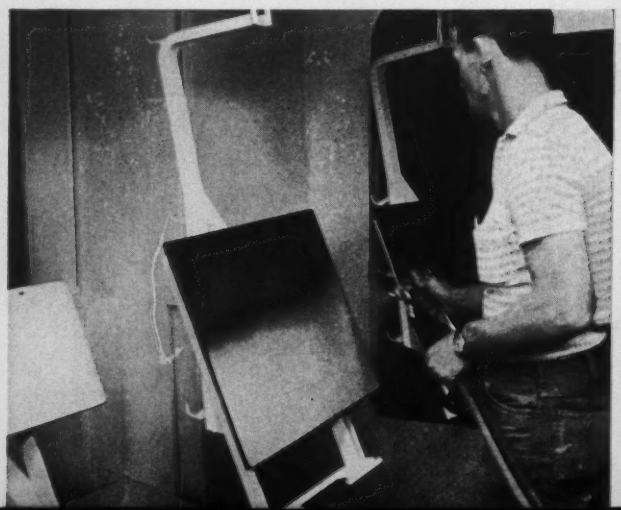
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

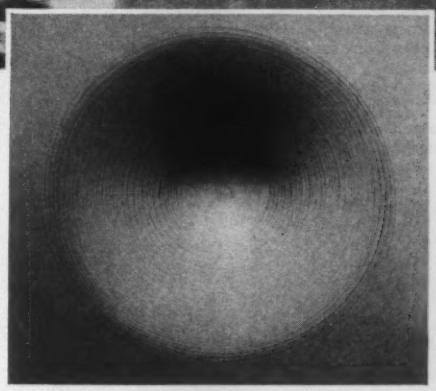
Front panels passing through pickle line. For direct-on enameling GE made simple modifications in pre-treatment. Here a ferric nitrate solution is the pickling agent, followed by a nickel strike (Ni range: 0.05-0.15 gr per sq ft).



General Electric uses the same titania-opacified frit in their direct-on enameling as in the two-coat operation. Because of Bethnamel's negligible carbon content, boiling and fishscaling have been no problem.



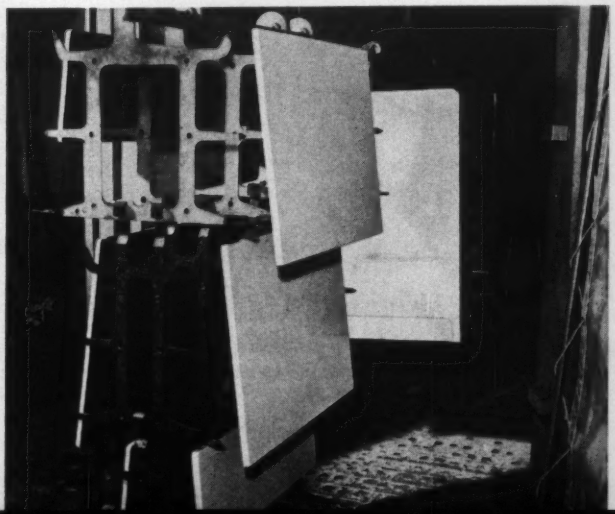
View of assembly line at General Electric's Range Division, Appliance Park, Louisville, Kentucky, where Bethnamel panels are mounted on 30-inch ranges.



Note the well-nigh perfect adhesion on this actual-size view of test panel made at GE's Appliance Park Range Division plant. Standard Porcelain Enamel Institute test was used.

BETHLEHEM STEEL

Direct-on Bethnamel panels are fired at 1450 deg F, for 4 minutes. At this temperature Bethnamel has consistently exhibited superior sag resistance.



Assembling and inspecting finished door panels. Acceptance of direct-on Bethnamel parts runs at an average rate of 85-90 pct on first fire.

For Quality and Economy Use

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Eastern Malleable Iron Co., Wilmington 99

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Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

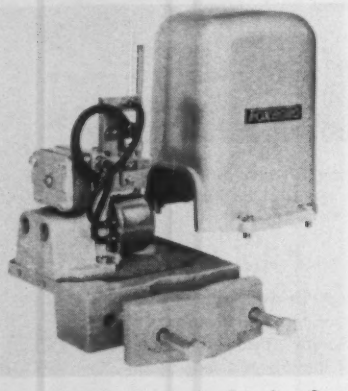
WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

DESIGN DIGEST

Converts Current

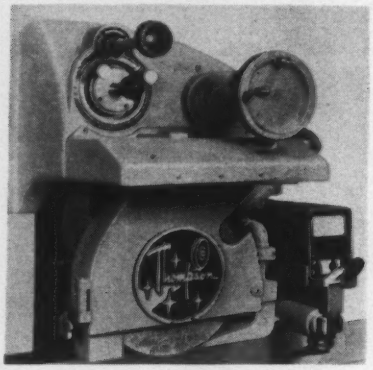
Here's a direct-current transmitter with an unusual function. It measures dc current and transmits these measurements pneumatically to a central receiver. The principle of operation is inferential. The unit senses the magnetic field established by dc current flowing through a bus-bar conductor. Magnetic lines of force, surrounding the conductor, deflect a pivoted, rod-shaped magnet in the transmitter. The torque associated with this deflection is directly related to the intensity of the magnetic field, and hence to current flow. This torque operates a flapper-nozzle in the pneumatic force - balance system. Then the 3-15 psi pneumatic output is transmitted to a remote receiver. Several advantages are apparent in the system. In the first place, there's no contact of any kind between the transmitter and the current-carrying member. Also, the system maintains accuracy to ±0.5 pct of the maximum-current value. (The Foxboro Co.)



For more data circle No. 28 on postcard, p. 157

Grinding Attachment

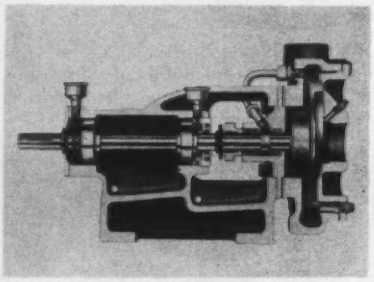
Until recently, problems of reciprocating table motion, interrupted surfaces and extremely-rough conditions have defied accurate gaging control. However, with this new gage amplifier, workpieces can actually traverse or rotate under the gaging anvil and produce highly-accurate, machine-control signals. High speeds and holes or steps in the workpiece don't affect accuracy. The electronic gage selects the major dimension only. Since gage circuitry ties in with the existing-grinder hydraulic or electrical circuit, setup time is practically eliminated. The desired dwell and final size is simply dialed in on the calibrated console control knobs. (Electro-Autosizing Machine Corp.)



For more data circle No. 29 on postcard, p. 157

Pump Cuts Wear Costs

An important benefit that is standard on a line of heavy-duty end-section centrifugal pumps is axial adjustment of the semi-open impeller. With this feature, you can regulate capacity and head and adjust for impeller wear. This can be done while the pump is running. The shaft-adjustment nut prevents any forward axial movement of the impeller. No new part is needed for the adjustment and it immediately improves performance. This feature results in reduced replacement and maintenance costs. (The Deming Co.)



For more data circle No. 30 on postcard, p. 157

Magnetic Limit Switch

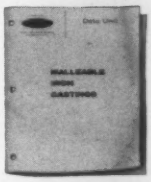
Made in West Germany, a new magnetic limit switch actuates it-

Malleable Puts More Muscle in Machinery

In the agricultural equipment field, reputations depend on building products that can take rough treatment . . . and give real value. To do it, agricultural equipment manufacturers rely heavily on Malleable iron castings.

Malleable's excellent ductility and shock resistance mean longer life and fewer problems than obtainable with fabrications. Low start-up cost for small quantities also is vitally important in this competitive industry.

Put more reputation-building quality into your products at less cost with Malleable. For design assistance or quotations, call any company that displays this symbol —



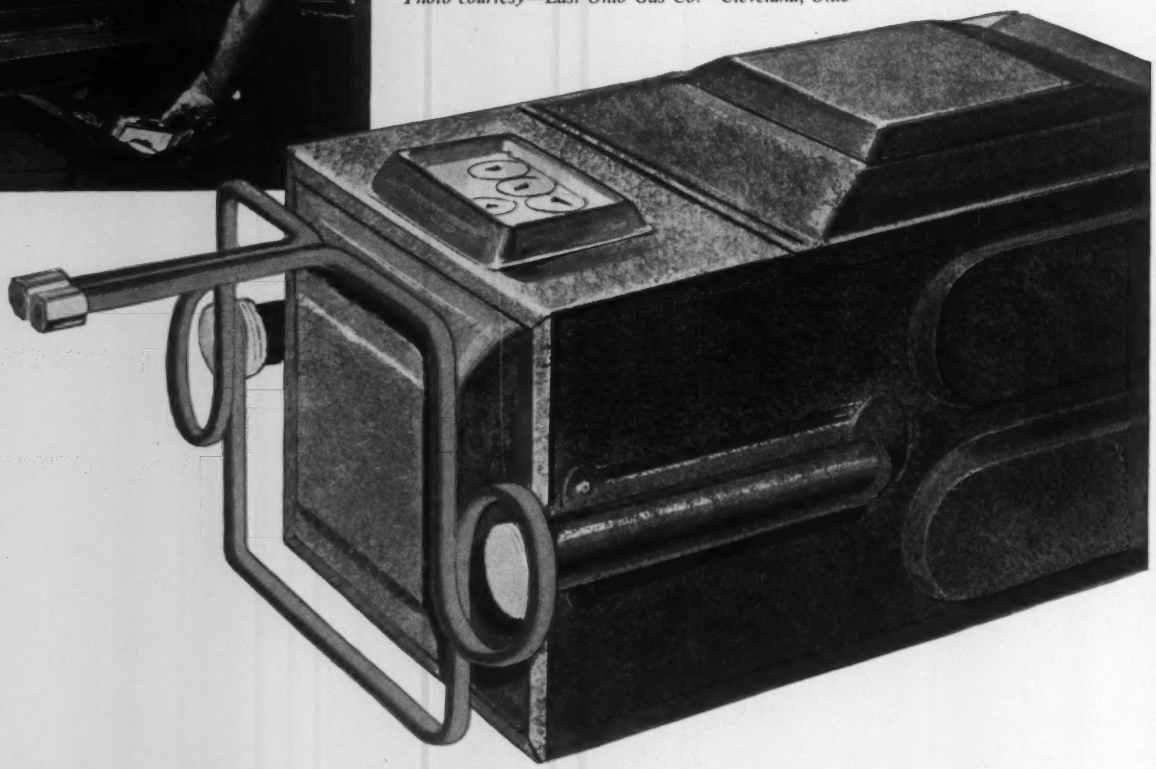
PROBLEM-SOLVING IDEAS are yours free in Data Unit No. 115. For your copy, ask any member of the Malleable Castings Council, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

MEMBER
MALLEABLE
CASTINGS COUNCIL

The versatility of Malleable castings is reflected in the variety of ferritic and pearlitic Malleable tractor parts, from the tough, dependable front axle bar to bolsters, lift arms, clamps, clevises, hitches, hinges, foot pedals, transmission planetary carriers and clutch parts.

Operator removes top meter panel from tray where it has fallen after being de-soldered.

Photo courtesy—East Ohio Gas Co.—Cleveland, Ohio



Gas Meters De-Soldered 5 Times Faster

with TOCCO Induction Heating*

In just 60 seconds panels are removed for repair of gas meters—a job which formerly required up to 15 minutes with a conventional soldering iron. East Ohio Gas Co.'s 7½ kw 10,000 c.p.s. TOCCO unit has been giving trouble-free operation for 13 years—handling about 75,000 meters per year.

All sizes of meter panels, from 8″ x 12″ to 30″ x 30″, are de-soldered with only four different induction coils. Changing coils takes about three minutes.

If you have a job involving disassembly, joining —or for that matter, the heating of metals for almost any purpose—look to TOCCO for fast, economical results.

THE OHIO CRANKSHAFT COMPANY

***Mail Coupon Today*— NEW FREE Bulletin**

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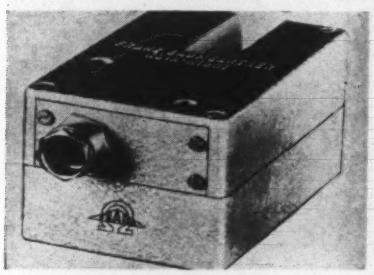
self by means of an external vane passing through a slot in the sealed housing. No physical contact takes place between static and moving

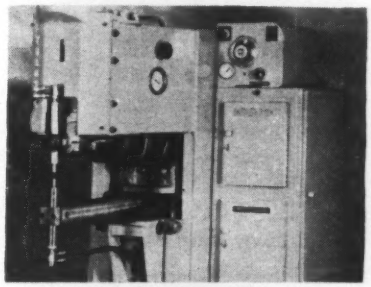


machine components. The contacts are sealed internally in an inert-gas-filled tube for permanent protection against contaminants. Thus, service life goes as high as one hundred million cycles, depending on current and voltage. In addition, the switches function as rapidly as 40 times per second. They come in normally-open and normally-closed models. (Sta-Fast, Inc.)

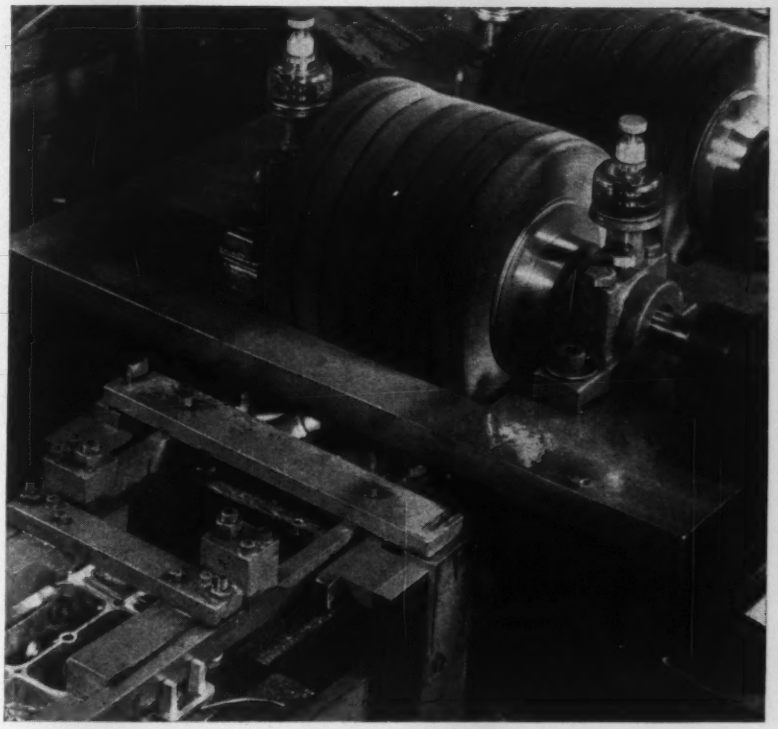
For more data circle No. 31 on postcard, p. 157

Welding by Numbers

A new resistance-welding control integrates as many as six spot- and projection-welding variables into a single dial. It automatically determines the proper settings for over 100 different material thicknesses and compositions. Adapta-



ble to new and used air-operated machines, it eliminates most setup operations. And, when you're resistance welding a range of joint designs, it removes the guesswork; makes for better standardization. Forget about setting the controls every time work thickness changes. The new unit establishes weld time, weld heat, tap selection, welding



AUTOMATIC FLASH REMOVAL SETUP for die-cast zinc carburetor parts. Two brushing heads—each made up of seven Osborn Master® Wheel brushes—are mounted over the conveyor. Parts (shown fixtured in lower left corner) pass under brushing heads where all flash is removed as they travel to next work station.

OUTPUT TRIPLED from 200 to 600 an hour with OSBORN power brushing

Before: this auto equipment maker was using costly off-hand methods to remove flash from these die-cast zinc carburetor parts. Production was slow . . . it varied from shift to shift, averaging about 200 pieces per hour.

Now: parts are Osborn power brushed clean as they travel between work stations by conveyor . . . *eliminating manual handling.* The setup of Osborn Master® Wheel brushes does the job at rates up to 600 pieces per hour . . . *three times as fast.* The operation is simple, inexpensive. Results are uniform, with excellent quality control.

This application is typical of how *your* tough metal finishing problems of every description—deburring, cleaning, polishing, precision blending—can be solved with today's Osborn power brushes and brushing methods. An **O**sborn **B**rushing **A**nalysis—made at no obligation in your plant now—is the first step. Write or call *The Osborn Manufacturing Company, Department F-111, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

OSBORN

Metal Finishing Machines
. . . and Finishing Methods
Power, Paint
and Maintenance Brushes
Foundry Production
Machinery

Yes . . . I'd like more information on Osborn Power Brushes and Metal Finishing Methods. Please send:

☐ New 114-Page Brushing Catalog 210-D
☐ "How to Select Power Brushes" Brochure
☐ Please have a Field Representative contact me.

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Company_____
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The construction industry spends, conservatively, $20 billion each year for products and materials. Your firm can sell to this lucrative market through the facilities of The Cerand Corporation.

A practical-minded research and development organization with a total of 40 years experience in the construction industries, Cerand provides a fresh viewpoint on any civil engineering problem.

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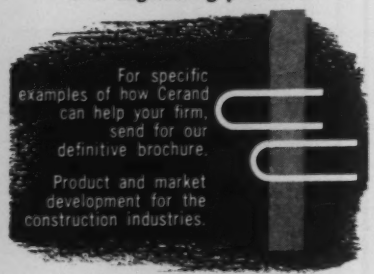
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Product and market development for the construction industries.

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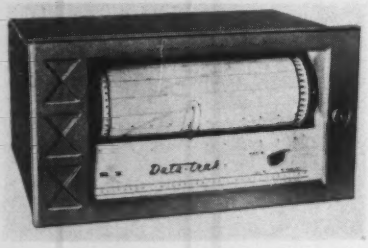
285 Columbus Avenue, Boston 16, Mass.

pressure and other variables for a pre-determined materials combination. (Thomson Electric Welder Co.)

For more data circle No. 32 on postcard, p. 157

Follows Curves

This unusual new item converts a manual set-point control to automatic program control. Here's how it works. When you add a pencil-drawn curve, and connect three wires from the newcomer's potentiometer to your control circuits, the instrument stylus follows your program. This stylus motion turns a control potentiometer. As many as four, 3-gang potentiometers may be driven by the same follower to provide up to 12 synchronized control



signals. Program chart, follower probe, and curve position indicators are always visible through the glass cabinet door. (Research, Inc.)

For more data circle No. 33 on postcard, p. 157

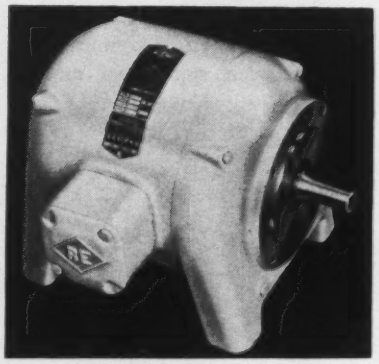
Hydraulic Cylinders

A new line of low-pressure cylinders cut costs where high-pressure functions aren't needed. Ranging from 1½- to 6-in. diam, they handle up to 1500 psi. A steel barrel makes them rigid. Close-fitting iron pistons promote long life. Also of note, an unusual seal arrangement automatically lubricates the bearings. For high-temperature operation, or for use with special oils, they come with Viton seals and packings. (Milwaukee Cylinder Co.)

For more data circle No. 34 on postcard, p. 157

Sanitary Motors

A new line of sanitary motors, designed to conform with the 3A Sanitary Standards Code, has just been announced. Applications for the newcomers exist wherever machinery processes or packages food, dairy or beverage products. These

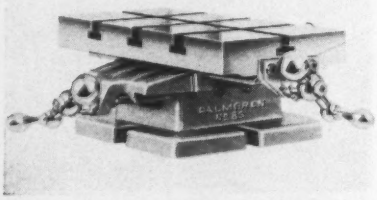


applications require many special features. Typical of these is the motor's splash-proof, all-aluminum-alloy, non-corrosive frame. Additional features include a stainless-steel shaft, special acid-resistant finishes and a convex, smooth contour. Perforated removable screens give positive protection against insects. (Rueland Electric Co.)

For more data circle No. 35 on postcard, p. 157

Dual Milling Table

For accurate milling on drill presses, a new cross-slide milling table also suits milling machines and grinders as well as layout work. It comes with a 10 x 6-in., or a 12 x 6-in., table surface. Both sizes have one longitudinal T-slot and three, equally-spaced cross slots. Transverse travel is 4½ in. Longi-

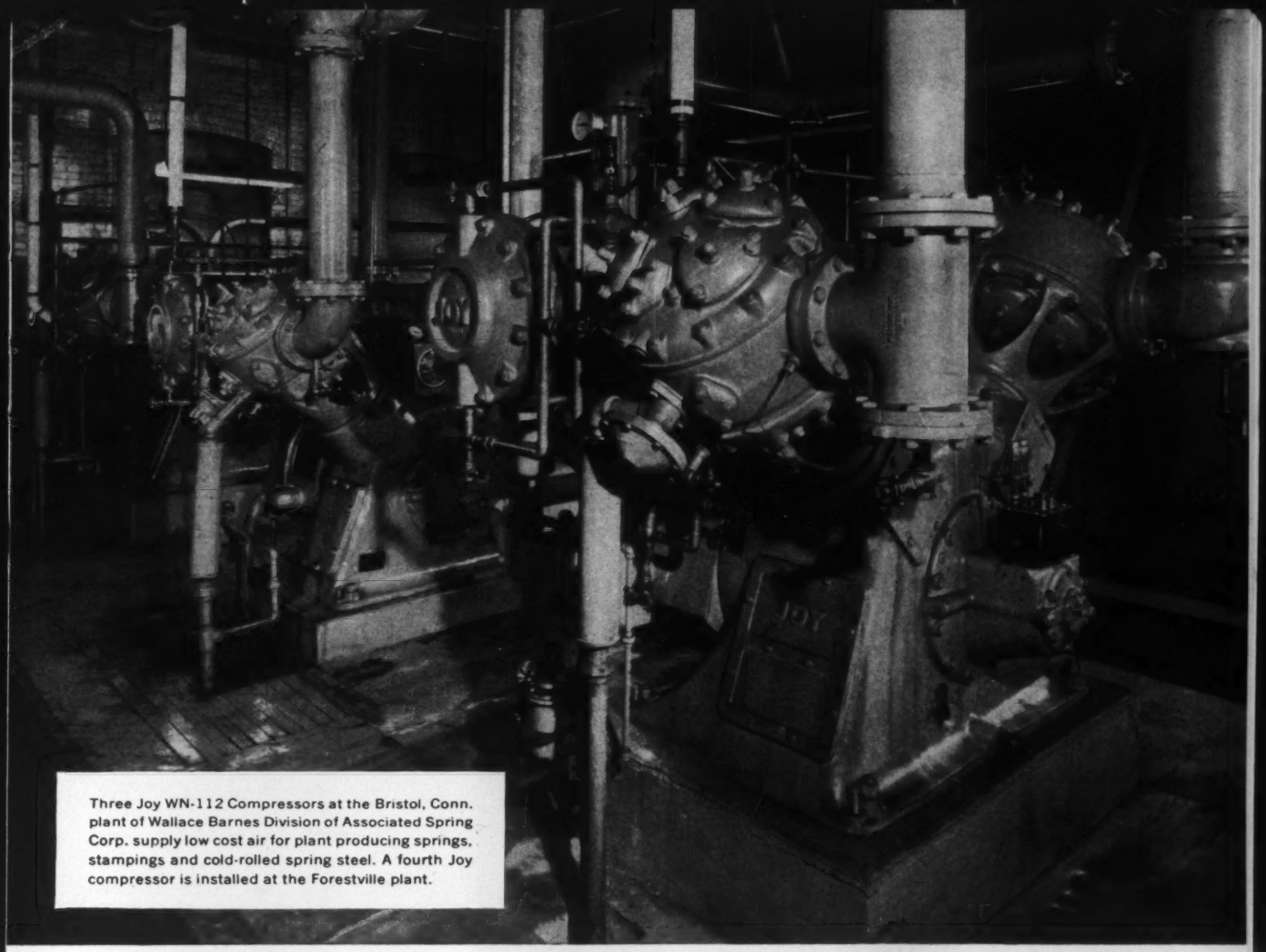


tudinal travel is 6 in. Other features include easy-to-read dials and removable balance cranks. (Palmgren Steel Products.)

For more data circle No. 36 on postcard, p. 157

Self-Locking Plug

Here's a pipe-type closure that locks itself in place as it seats. It also provides a secondary adjustment when internal pressure is applied. The device consists of a series



Three Joy WN-112 Compressors at the Bristol, Conn. plant of Wallace Barnes Division of Associated Spring Corp. supply low cost air for plant producing springs, stampings and cold-rolled spring steel. A fourth Joy compressor is installed at the Forestville plant.

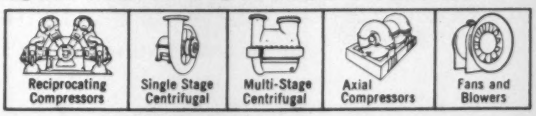
Four JOY Compressors in service a total of 54 years at Wallace Barnes—only $1161 in repair parts and service

Four Joy WN-112 Compressors at Wallace Barnes Division of Associated Spring Corp. have a remarkable service record, which has resulted in extremely low cost plant air. The four machines have a total of 54 years in service, in a three shift operation, yet repair parts and labor have totaled only $1161. According to the operator, maintenance amounts to changing the oil periodically and occasionally replacing a valve part. Total capacity of the compressors is 3500 cfm.

Performance like this is remarkable, even for Joy compressors, and depends upon adequate care of the machines. However, you can count on low maintenance and a high degree of reliability from any of the Joy compressors.

Consult your Joy representative whenever you want low cost air. Reciprocating Compressors in both standard and oil-free construction are available from 15 to 1250 hp; Centrifugals and Axial Compressors from 15 to 15,000 hp. For complete details on the Joy WN-112's, write for Bulletin 3205-48.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

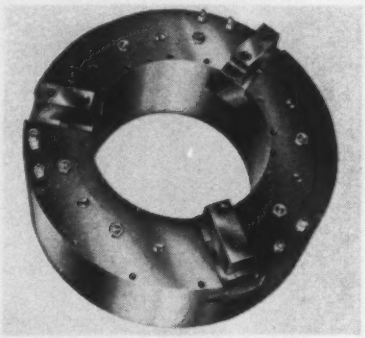
In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

of cam segments inserted in a sealing ring. As the plug seats in an aperture, these locking-cam segments move out to engage the aperture wall. Then, when internal pressure is applied, the cam sections back out just enough to engage a shoulder provided at the edge of the aperture. Exhaustive tests show no marking of the cam segments after 1000-pressurized locking cycles. The plug closures come in sizes from 2-in. diam and up. They are being used successfully in reactor standpipe applications and in other piping systems such as molding presses and similar equipment. (The Stanat Mfg. Co., Inc.)

For more data circle No. 37 on postcard, p. 157

Holds the Workpiece

Open construction allows the workpiece to pass completely through the body of a new work-holding chuck. Once an air supply is applied to the inlet valve on the chuck body, the chuck jaws activate.

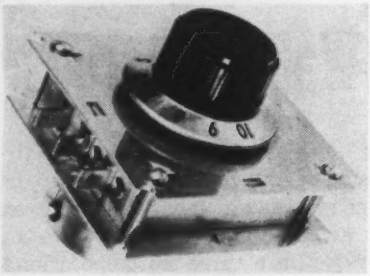


Now disconnect the air; the chuck housing retains the air pressure. This means the chuck can travel in any manner along with the machine it's mounted on. There are no encumbering air lines. (Mollenberg-Betz Machine Co.)

For more data circle No. 38 on postcard, p. 157

Reliable Timers

Manually adjustable for intervals of five seconds to five hours, a new series of timers boasts reliability and long life. According to company engineers, the series is a simplified version of highly-reliable timers designed for military use. These units were adapted to commercial use without surrendering any of the ruggedness or precision of the military version. The new-

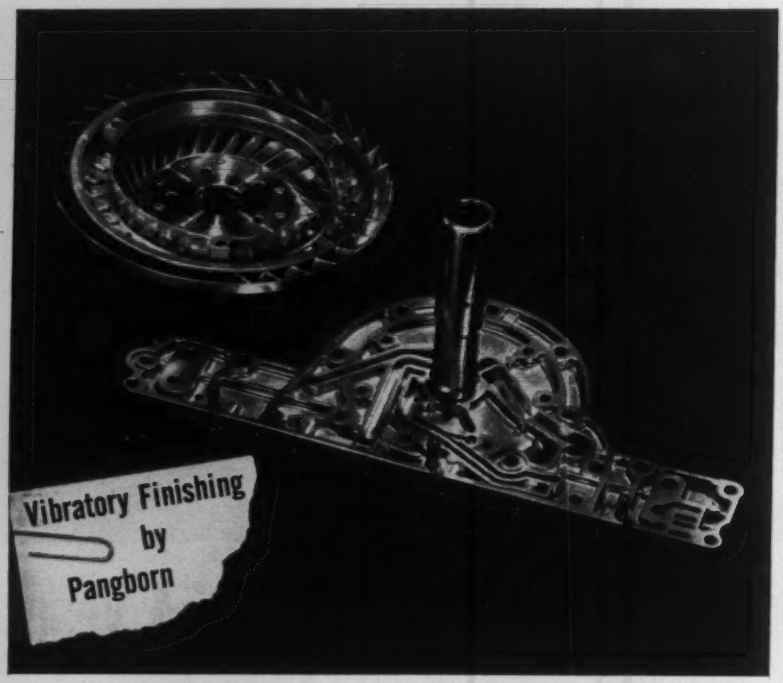


comers operate as a time-delay mechanism, or as a straight-interval timer. Alternate methods of field wiring allow you to control power duration, or the delay period before the power's applied. (The A. W. Haydon Co.)

For more data circle No. 39 on postcard, p. 157

Boosts Pressures

Quite often, it's necessary to boost the shop-line pressure up to



Suddenly complex finishing has a simple solution!

The Pangborn Vibratory Finishing Machine has an unusually wide range of application. What would you like to descale, deburr, radius, finish or burnish?

Metal and metal alloy as well as many plastic and ceramic parts may be vibratory finished. This machine processes extremely small and delicate items with the same facility it handles large and heavy objects.

What's more, the Pangborn Vibratory Finishing Machine performs as much as 100 times faster than conventional equipment. Cuts costs? You bet!

All sizes of the machine come equipped with variable speeds and amplitudes plus new improved air-cushioned suspension. Optional air-cushioned floor mounts completely eliminate any transmission of vibration to the floor. Auxiliary equipment and the best in media and compounds are available for your every need. Send parts with exact finish specifications or finished specimen for sample processing in our laboratory to Mr. William E. Brandt at:

PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada Ltd. 47 Shaft Rd., Toronto (Rexdale), Canada — *Manufacturers of Vibratory Finishing, Blast Cleaning, Dust Control Equipment — Rotoblast® Steel Shot and Grit®.*

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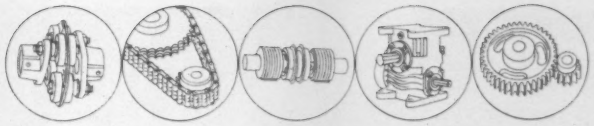

Morse has an answer to every industrial drive problem under the sun

From oil rigs, boats, and cars to missiles, mowers and machinery—look first to Morse for transmission of motion or power. You'll get impartial engineering help and immediate delivery on a complete range of products: Basic Drives, Speed Reducers, Couplings, and Clutches. Basic Drives alone include stock gears, roller chain, silent chain, "Timing"® Belt, and Hy-Vo® Drives. You'll find your Morse man in the Yellow Pages. Or write: Morse Chain Co., Dept. 33-61, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

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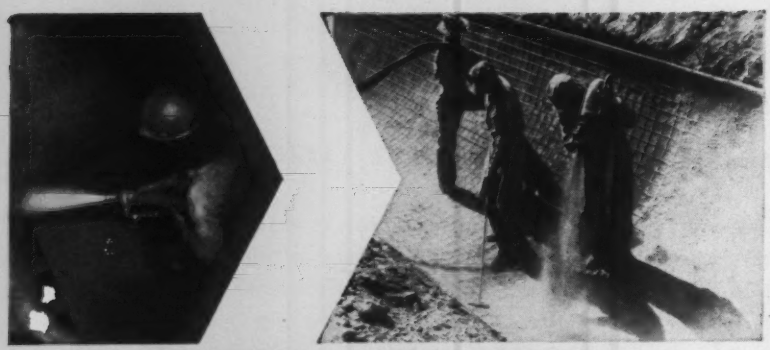

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applies adhesive strength of sand-cement layer up to 10" thick in a continuous application!

Force sprays into every crack, crevice and corner for permanent strength in building, repairing or waterproofing concrete construction. Effective for sandblasting, when used without sand-cement mix. Completely dependable, both in operation and results. Has wide application in Steel Industries, Foundries, Refineries, Refractories, all Construction areas.

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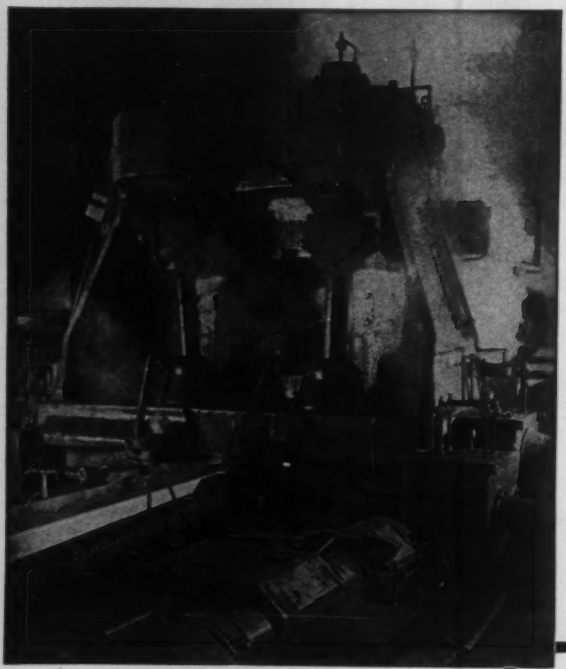


Edging hot strip steel

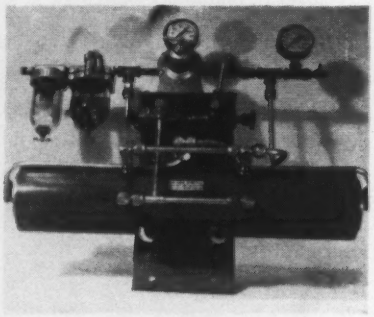
No place for second-best equipment. That's why this heavy-duty vertical overdrive edger uses rugged Cone-Drive double-enveloping worm gearing to drive the vertical rolls continuously.

Rugged Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS
DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

DESIGN DIGEST

two and three times the normal pressure. This can be done by applying a new booster pump to any location in the shop line. Thus,

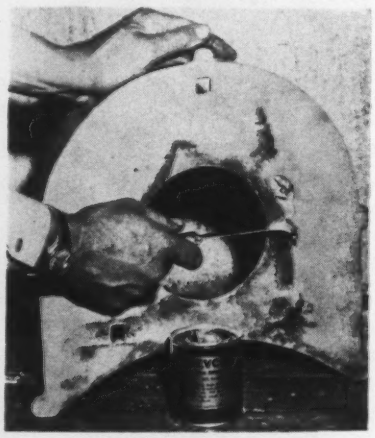


you get the desired pressure at the point of operation. Or, suppose there's a drop in the shop air-line pressure. Introduce one of these units to insure ample pressure at the point of operation. The self-contained booster pumps produce a maximum output pressure of 300 psi, on an air line of 80 psi. All necessary fittings, line filters, lubricators and gages are included in the one power package. (Dayton Rogers Mfg. Co.)

For more data circle No. 40 on postcard, p. 157

Repairs Castings

For filling large blow holes and other imperfections in bronze and brass castings, a new repair com-



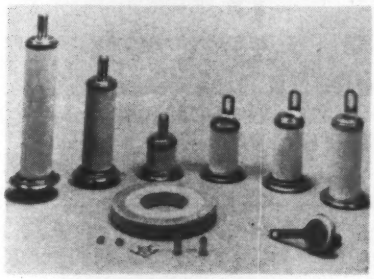
pound consists of 80-pct bronze and 20-pct plastic. It's easy to use —simply mix the compound with a hardening agent and apply. It hardens in about two hours without the use of heat or pressure. Once it's hard, you can drill it, grind it

or machine it like metal. After machining, the repair looks just like the bronze itself. And because of its high-bronze content, the compound expands and contracts like metal. Thus, it effects a permanent repair. (Devcon Corp.)

For more data circle No. 41 on postcard, p. 157

Component Bases

Mounting an electronic component on these dense, high-strength ceramic bases accomplishes two important objectives for the industry. First, the ceramic construction offers an extremely-rugged dielectric base. Secondly, it permits useful temperature limits in the order of 1000°C. The bases are made of alumina ceramic ranging in purity from 85-95 pct. Furthermore, their nickel-plated, high-temperature metal coating permits the user to silver braze or soft solder the closure. The units mount components such as resistors, diodes, transistors and capacitors. (Metalizing Industries, Inc.)



For more data circle No. 42 on postcard, p. 157

Upgrades Plant Safety

Double - door, dead - front construction discourages unauthorized entry to a combination motor starter. This is a novel approach to plant safety. For normal maintenance, the main door opens with a screwdriver when the circuit breaker is in the "off" position. An additional screw must be turned to gain entrance when the breaker is on. Once the door is open, you must depress a defeater mechanism before turning the circuit breaker on. It's impossible otherwise. This protects maintenance personnel from power being accidentally turned on. The new starter itself consists of magnetic motor starter, control transformer and branch-circuit protective device (either the circuit breaker or a disconnect switch). It comes in a NEMA type-12 enclosure. (General Electric Co.)

For more data circle No. 43 on postcard, p. 157

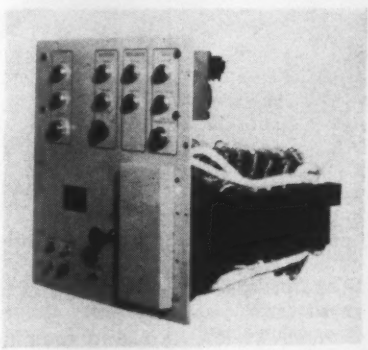
Filler-Cap Line

An expanded line of filler caps and accessories solves many industrial and automotive applications. They snap open and stay open; snap closed and stay that way. In addition, the distinctive, spring-loaded cap is a conspicuous protrusion when it's open. This cap cannot be dropped or lost, and it requires no chain. Three sizes are available from stock, with ⅞-, 1¼- and 2-in. free opening. (Technical Development Co.)

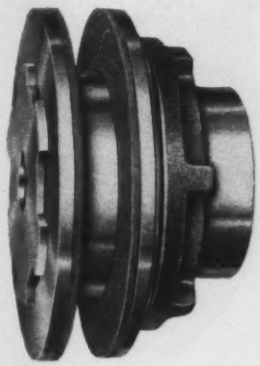
For more data circle No. 44 on postcard, p. 157

Process Control

Designed to shorten batching time, a new punched card, batch-process controller dictates all batching operations. It reduces waste, ups production and insures a more uniform product. To do this, it controls loading, filling, temperature, speed and pressure changes, and timing. Punched-plastic cards program the controller. Each card represents one recipe or formula. Therefore, no problems are pre-



A Morse answer



Torque limiters

...when the problem involves automatic overload protection

Protect expensive equipment

Eliminate shear pins

Lessen costly downtime

Adaptable to any drive

Easily adjusted

Controlled torque setting

Capacities: 10 to 6300 ft.-lbs.

Clutch sizes: 3 to 20 inches

Distributor-stocked

Got a clutch problem? Call your Morse distributor. He's listed in the Yellow Pages.

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Morse Chain Co., Dept. 33-61, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

PUMPS THAT "GROW"

Versatile Centrifugal

Interchangeable on the same power frame, you need merely put larger liquid ends and motors on Deming End Suction Centrifugals to increase your pumping capacity as your production needs grow. Literally thousands of everyday parts combinations. Standard parts—no inventory problems. Write today for full information.

The DEMING Co.
671 BROADWAY • SALEM, OHIO

Let SUN SHIP solve your machine problem

When you need machine work or specially built machinery of any kind, you'll find Sun Ship qualified to do the job exactly to your specifications. We have machine tools of every size, and the facilities and skills born of long experience.

When you have a machining problem, write or phone

SALES ENGINEERING DEPARTMENT

Sun SHIPBUILDING & DRY DOCK COMPANY
CHESTER, PA.

PHOTO COURTESY REYNOLDS METALS CO., RICHMOND, VA.

With a Ductomatic, you can accurately predict forming quality, and reject defective material before it is fabricated.

The new Tinius Olsen Sheet Metal Tester—by reproducing actual deep draw forming stresses—reveals more important, usable data than any other ductility tester.

By cutting scrap losses, eliminating rework and prolonging the life of costly dies, the Ductomatic quickly pays for itself.

Find out more about the Ductomatic—another years-ahead development from Tinius Olsen. Write today for Bulletin 62.

TINIUS OLSEN
Testing Machine Co.
2120 Easton Rd. • Willow Grove, Pa.

PUZZLED . .

about personnel problems

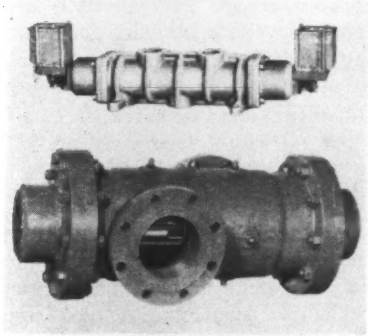
Dissatisfied with present recruiting methods? The IRON AGE Employment Exchange is the meeting place for employers, and men qualified in all phases of metalworking. For advertising rates, write to Chestnut and 56th Sts., Philadelphia 39.

sented in operations where many formulas are manufactured from varying combinations of the same ingredients. In fact, the controller particularly suits these processes. (Control Equipment Corp.)

For more data circle No. 45 on postcard, p. 157

Large Air Valves

These large, high-capacity air valves come in sizes up to 8-in. diameter. They're well suited for air service to 250 psi. One obvious advantage of bigness is that, in many instances, it can eliminate the need for multiple valving to meet flow requirements. With this extra size, air flow capacities range up to more than 32,000 cfm at 100-psi



pressure drop. All valves feature a hollow-ported plunger and U-packer design. The packer design takes advantage of pressure—the higher the pressure the tighter the seal. (Hunt Valve Co.)

For more data circle No. 46 on postcard, p. 157

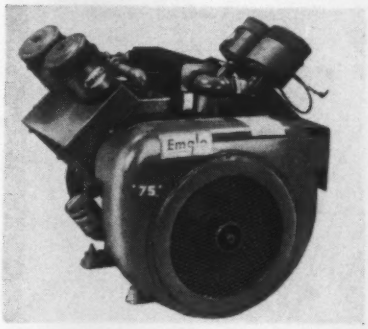
Eliminates Costly Jigs

For precision rotary positioning, a horizontal-drilling and spacer attachment provides fixture accuracy. But, there's no fixture cost or lead time. The newcomer teams a rugged, multi-index spacer with an accurate drilling device. It guarantees repeat indexing within low tenths; a radial accuracy of 0.001-in. cumulative error, on a 6-in. circle. A planer gage, a micrometer or gage blocks set up the attachment. Once set, it retains high accuracy, even under the torque of heavy drilling or boring cuts, interrupted cutting and side thrusts. (Erickson Tool Co.)

For more data circle No. 47 on postcard, p. 157

Compresses Air

A new, 4-cylinder, single-stage air compressor delivers 75 cfm at

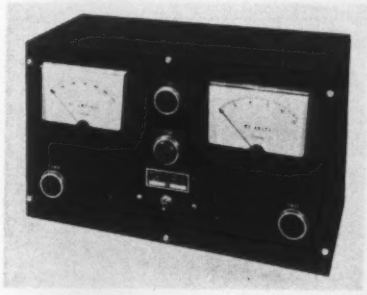


100 psi. Thus, it's capable of running a hand-held rock drill, an 80-lb paving breaker or a ¼-in. sandblast nozzle. Any suitable electric or gas motor supplies the power. Efficient air cooling makes it a light, easy - to - service machine. (Emglo Products Corp.)

For more data circle No. 48 on postcard, p. 157

Plating Control

This new control approaches truly - automatic, current - density control on continuous-plating production operations where racks have about the same area. It consists of an ammeter, voltmeter, automatic-manual switch, raise-lower push-buttons and average current-density modules to control the plating rec-



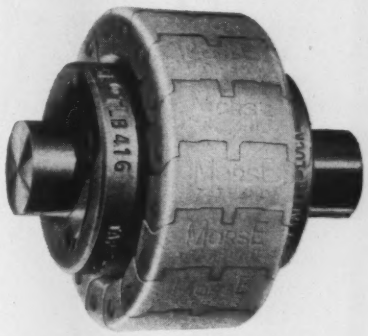
tifier. It may be furnished integrally with the plating rectifier, or separately for remote operation. (Dresser Electric Co.)

For more data circle No. 49 on postcard, p. 157

Ultrasonic Probe

This accurate, ultrasonic probe was developed in response to many

A Morse answer



Nylon couplings

. . . when the problem involves corrosion, cost, lubrication

Corrosion-resistant
Cost 20% less
Lubrication-free
Safety first
Easy disassembly
Standard stock sprockets
Fractional to 40-hp. loads
Speeds up to 5,000 rpm.
Distributor-stocked

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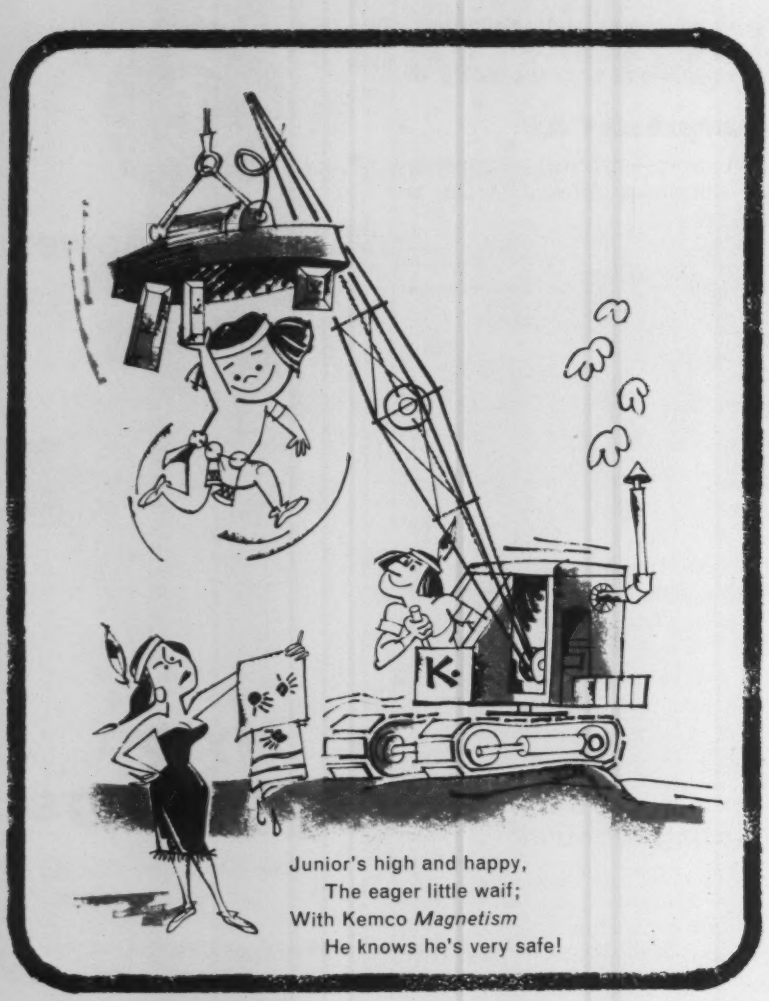

Junior's high and happy,
The eager little waif;
With Kemco *Magnetism*
He knows he's very safe!

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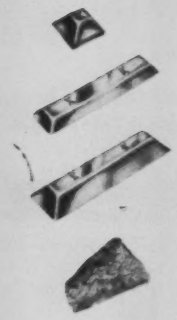
KEMCO SILVERY PIG IRON

SILICON METAL - OTHER FERROALLOYS



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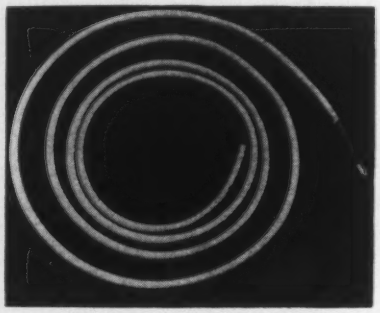
requests for a low-priced instrument. Teamed up with an inexpensive oscilloscope, the probe has

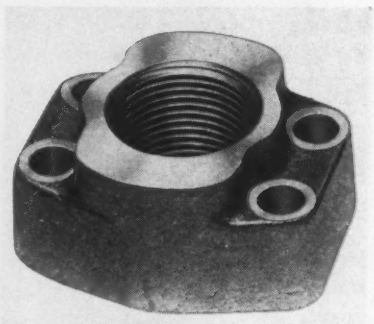


many applications. For instance, it displays sound levels in ultrasonic cleaning tanks. This lets you compare sound levels over a period of time or in different tanks. Or, you can locate the best position and power level for cleaning and processing and set similar sound levels with different amounts and types of liquids. (Vibrasonics, Inc.)

For more data circle No. 50 on postcard, p. 157

Pipe Fittings

A new O-ring, pipe-thread fitting has recently been added to a line of hydraulic fittings. The O-ring units are available for pipe sizes from ½-3 in. They join the pipe to flange-type connectors, eliminating thread-type connections. The result



is unusual flexibility in pipe and tubing assemblies. (Anchor Coupling Co., Inc.)

For more data circle No. 51 on postcard, p. 157

Welding-Tip Holders

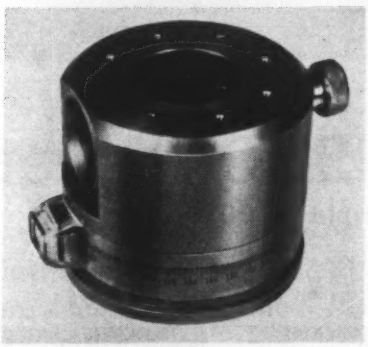
Minor variations in electrode wear or work thickness won't affect the weld when this electrode holder is on the job. It automatically exerts

equal forging pressures through its two tip-holding barrels. The equalizing mechanism is purely mechanical. Therefore it provides good conductivity through its working parts. In addition the unit precisely spaces the welds and reduces welding time. The offset tips allow spacing the welds from 0-4 in. The holder comes in two models. One mounts on the welder arm. The other bolts to a press-welder platen. (Air Reduction Sales Co.)

For more data circle No. 52 on postcard, p. 157

Checks Alignment

When used with an autocollimator or similar optical-sighting device, a new optical polygon provides an accurate mirror surface which reflects the projected image of the collimator's cross hairs. The deviation between the reflected image and the cross hairs gives a geo-



metric check on parallelism, misalignment or angularity. The device consists of a compact indexing unit, with an optical mirror mounted on its rim. It's accurate to within 0.000012 in. at a 20-in. diameter. (Michigan Tool Co.)

For more data circle No. 53 on postcard, p. 157

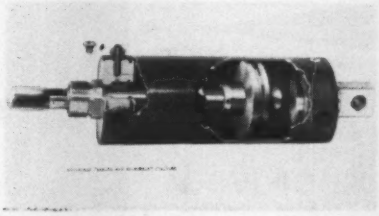
Signals Trouble Source

A new control system monitors the operation of punch presses, drill presses, wire machines, plastic-stamping, extrusion and other related equipment. By automatically protecting dies, tools and machinery, it reduces downtime. Savings in material and scrap loss also result. This automation control system detects missing parts, mislocation, stock buckling, end of stock, material and finished-part size. When a malfunction occurs, it instantly shuts down the machine and signals the source of trouble. The signal is visual or auditory, or both. (W. J. Saeman Co., Inc.)

For more data circle No. 54 on postcard, p. 157

Cylinder Line

For air or hydraulic service to 200 psi, a new group of economical cylinders is the latest addition to a

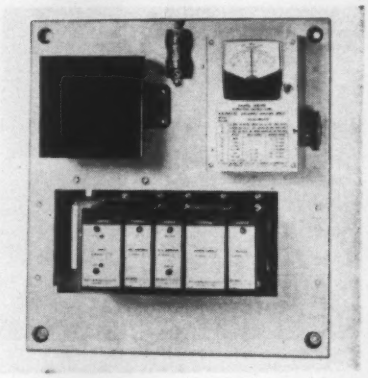


popular line of these items. The newcomers feature chrome-plated-steel piston rods with wrench flats and metallic rod wipers with automatic wear compensation. In addition, their special design permits installation of inexpensive, adjustable, cushion kits at any time without disassembly of the cylinder. Also included are interchangeable mountings and rectangular-feed locking of the heads to the cylinder barrel. (Modernair Corp.)

For more data circle No. 55 on postcard, p. 157

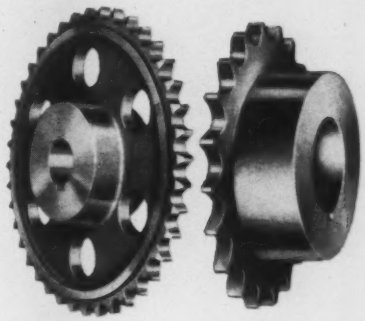
Regulates Drives

The first complete line of solid-state regulators and exciters for variable-speed drives is making its



debut. Substituting silicon controlled rectifiers for tubes, the new units speed up response time. Heart of the system is a pre-engineered control circuit that amplifies feedback signals. It mounts transistors,

A Morse answer



roller chain
sprockets

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Made to A.S.A. standards

Chain-maker quality

Precision pitch control

Controlled concentricity of bore, hub, and teeth

Advanced heat-treating processes

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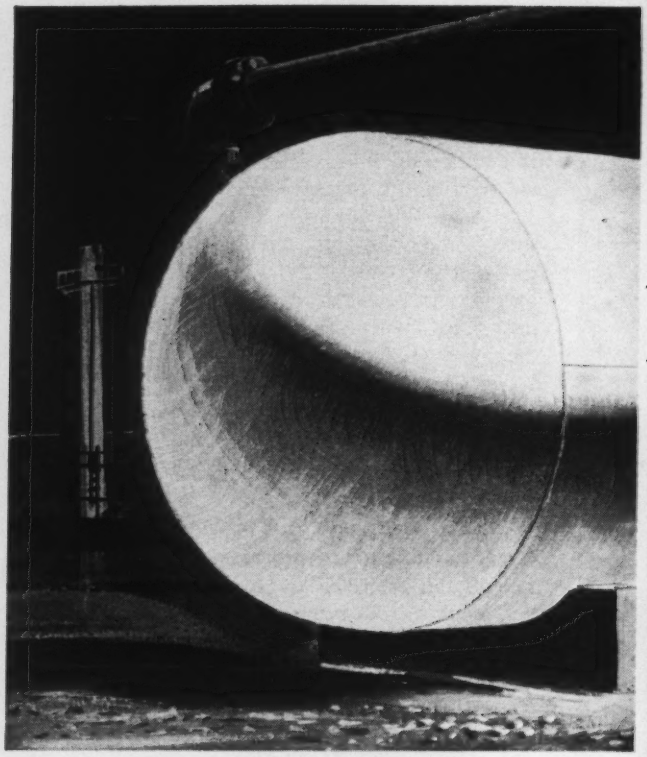
SSS 100 ALLOY STEEL

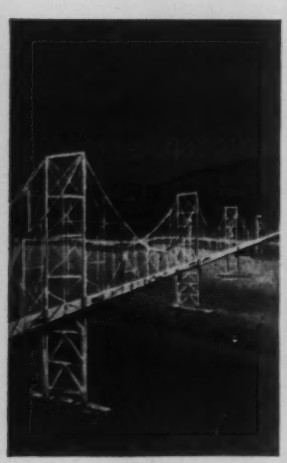
A.S.M.E. Approved

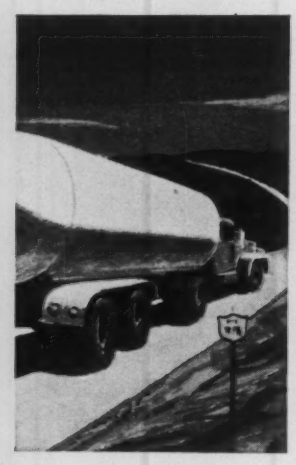
SSS-100 is approved for use in the construction of welded pressure vessels according to the requirements of Section VIII of the ASME Boiler & Pressure Vessel Code (Case No. 1298—Special Ruling).

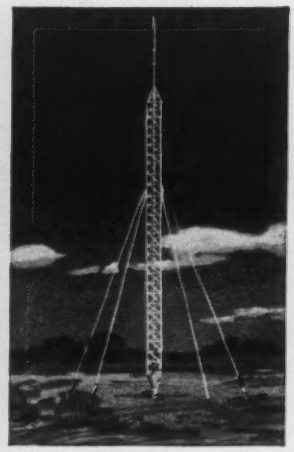


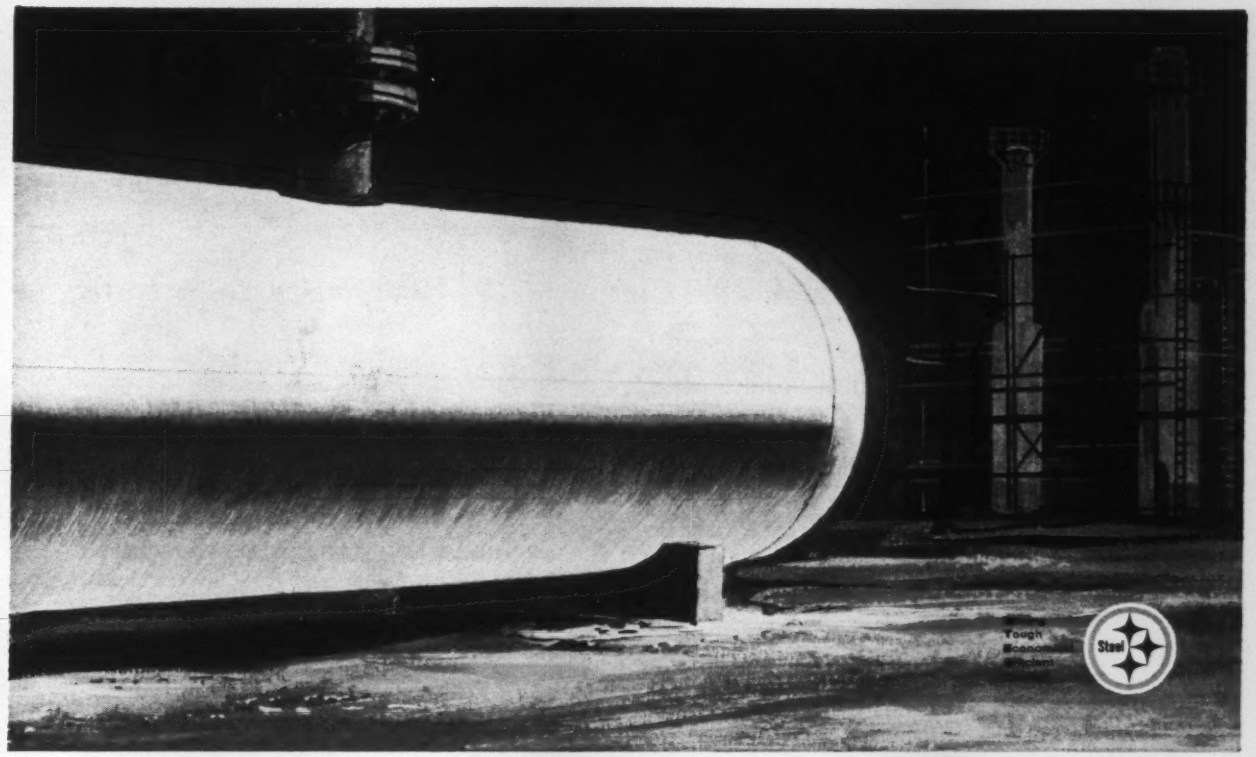
Sheffield's New SSS-100 Meets

(Triple S-100)









Growing Need For Tougher Steel

Quenched and Tempered Alloy Constructional Steel With New Weight-Saving Strength—Greater Durability Under Punishing Loads—Excellent Weldability for Easier Fabrication.

Here it is! Sheffield's answer to the challenging need for steel with new qualities to meet the pressures of today's construction:

New Sheffield SSS-100	
Tensile Strength	115,000 psi minimum
Yield Strength	100,000 psi minimum
Elongation (in 2 inches)	18% minimum
Reduction in Area	50% minimum

SSS-100 may be furnished to requirements of ASTM A-300 at –50°F in firebox or higher quality levels.

SSS-100 is the steel to specify—to demand—for storage tanks and pressure vessels, bridges, earth movers, heavy construction machinery, transport equipment, tank trucks, TV towers, fabricated structural shapes, missile ground-support equipment—any application that calls for a versatile combination of high strength, toughness and excellent weldability.

Sheffield SSS-100 is available in plates from $\frac{3}{16}$ to 2 inches thick, in blooms and billets for forging and subsequent heat treatment. Heat-treated bars can be furnished on inquiry. Also supplied heat treated to 321 minimum Brinell for use where resistance to impact abrasion is required.

For complete information and technical service, write **Sheffield Division, Armco Steel Corporation, Attention Alloy Sales, P. O. Box 3129, Houston 1, Texas.**

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capacitors and resistors on printed circuits. Each drive control system can be tailored to a specific job. (Reliance Electric & Engineering Co.)

For more data circle No. 56 on postcard, p. 157

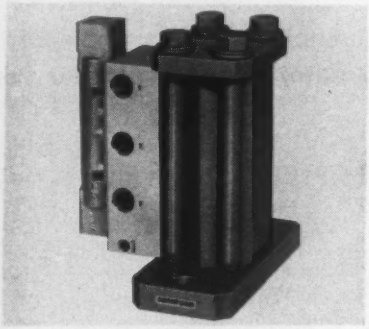
High-Purity Gold Plate

An extra-high-purity, gold-electroplating process is said to meet or surpass the most exacting specifications required by the manufacturers of transistors and other electronic equipment. The new process produces deposits of 99.99-pct purity. This affords uniformity of metallurgical characteristics never before attainable in gold electroplate. There appears to be no practical limitation to thickness. Electroforms to 30-thousandths of an in. are easily produced under commercial-operating conditions. (Sel-Rex Corp.)

For more data circle No. 57 on postcard, p. 157

Controls Impact

This new pneumatic sledge hammer boasts manual control of the



impact frequency and a full range of impact control. It attaches to a bin, chute, truck body, conveyor or any other materials-handling equipment that requires occasional blows to keep the materials flowing. Where air consumption is a major consideration, the new hammer is a natural. It takes less than 20 cu in. per blow. Manual pushbutton switches control the operation. However, optional solenoid valves are available for remote control. (The Branford Co.)

For more data circle No. 58 on postcard, p. 157

Edmund J. Haar, Chief Engineer of Compressor Plant, Thatcher Glass Mfg. Co., Streator, Illinois, and his new FM-2 compressor.

When you bank on compressed air...

Take a look at an operation that *really* depends on air. At Thatcher Glass Manufacturing Co., Streator, Illinois, compressed air plays vital roles. It supplies process air for glass blowing. It powers practically all of their expensive machines and handling equipment. Reliable air pressure is a *must*.

In a recent expansion of its compressed air plant, Thatcher decided on the new Cooper-Bessemer 600 hp FM-2 compressor shown above. This is one of the fine quality M-Line Series featuring "natural force balance" and recognized everywhere for dependable, low-maintenance performance.

Whatever you make . . . when you want compressed air for processing or power, it will pay you to investigate the Cooper-Bessemer M-Line Compressors. Call our nearest office.

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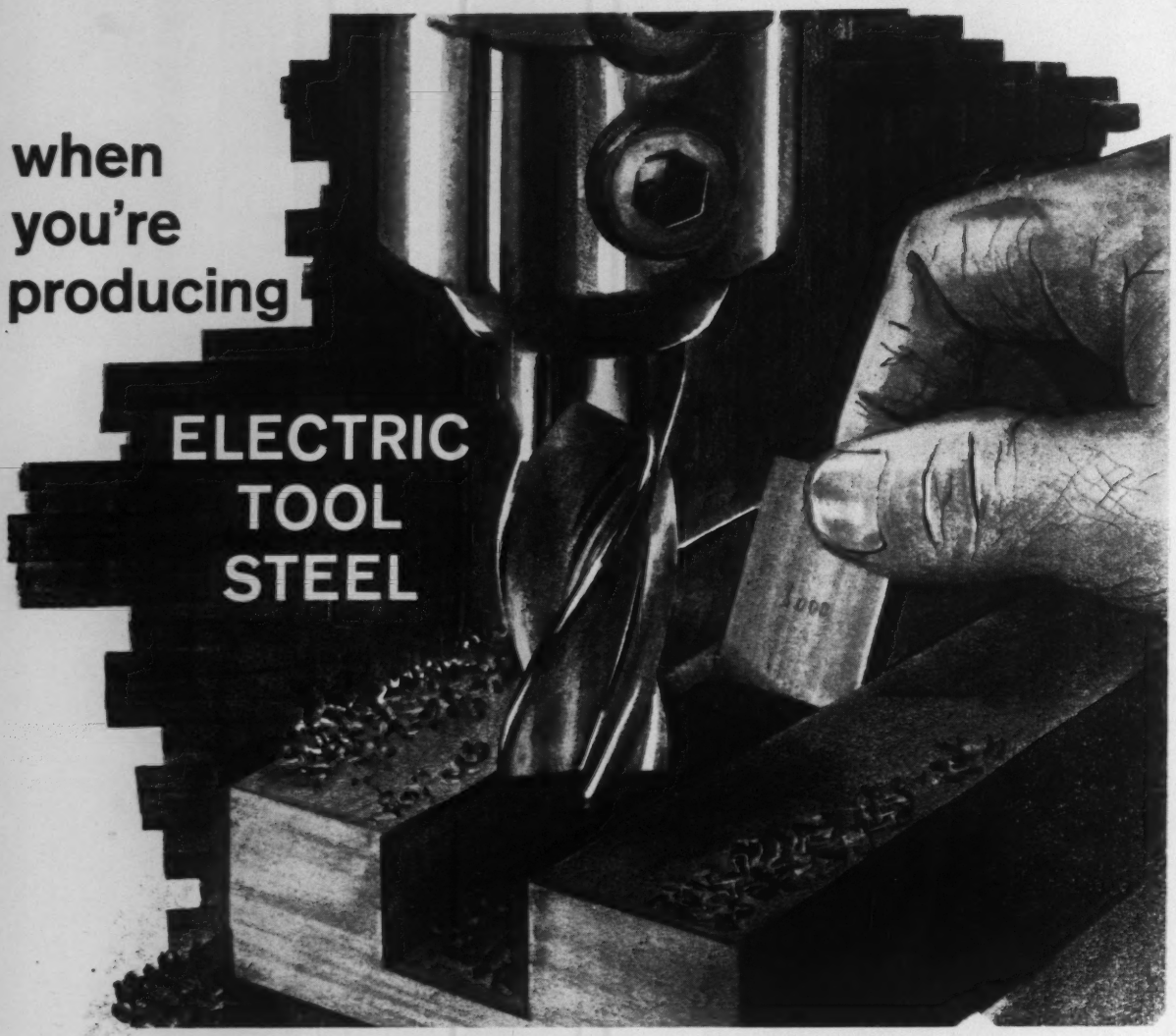
ENGINES: GAS · DIESEL · GAS-DIESEL
JET-POWERED GAS TURBINES

when you're producing

ELECTRIC TOOL STEEL



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GLC electrode technicians are thoroughly familiar with melt shop practice and problems. You can rely on their **promptness** and **competence** as fully as you can upon the **trustworthy performance** of GLC electrodes.

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New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Government Contracts

"Doing Business With the Federal Government," 58 pages, is aimed at small businesses that are unaware of Government procurement needs and bidding procedures. It's available through General Services Administration Business Service Centers located in 12 cities throughout the country. You can also pick up a copy at field offices of the Department of Commerce and the Small Business Administration.

For free copy circle No. 1 on postcard

Perpendicularity

A return to perpendicularity in nut-bolt fastening is urged by a recently-published technical bulletin. It reviews a new self-aligning locknut that compensates for out-of-squareness conditions as great as 8°. This unit eliminates destructive bending of bolts in cases of surface misalignment. (Standard Pressed Steel Co.)

For free copy circle No. 2 on postcard

Program Temperatures

Here's a new bulletin with complete information on a unit designed for linear or non-linear temperature programming of laboratory gas chromatographs. (Scientific and Process Instruments Div., Beckman Instruments, Inc.)

For free copy circle No. 3 on postcard

Centrifugal Casting

Highly detailed and fully illustrated, this 8-page brochure comprehensively covers the centrifugal-casting process. In addition, complete company facilities are described in text and pictures to acquaint the reader with equipment and processes. (Centrifugal Casting Co.)

For free copy circle No. 4 on postcard

Tooling Research

An attractive brochure tells all about a research center dedicated to the "continuing need for better machine tools." This center consolidates all of a machine tool manufacturer's research and development activity. (The Warner & Swasey Co.)

For free copy circle No. 5 on postcard

Grinding Pitfalls

This technical report points out the disastrous effects of metal damage caused by improper grinding of high-strength aircraft fasteners. In eight pages, it discusses the nature of the damage, how to detect the condition, and how proper fabrication techniques can prevent damage. (Standard Pressed Steel Co.)

For free copy circle No. 6 on postcard

Shock Simulation

Space-age applications call for new standards in shock testing. What's needed is a testing device that will produce shocks that are predictable, reliable and precisely repeatable. An attractive, well-written brochure gives the full story on such a device. (Consolidated Vacuum Corp.)

For free copy circle No. 7 on postcard

Teflon Unlimited

New bearings for problem applications, and the company's experience and capabilities in molding and fabricating fluorocarbons for industry, are described in a 3-page brochure. It points out how customer problems are studied individually to avoid temporary expedients. Long-range engineering

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Page .....Product .....

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FREE LITERATURE

solutions are the goal. (Modern Industrial Plastics Div., Duriron Co., Inc.)

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Switchgear

Advanced-design features of 600-v switchgear with unusual circuit breakers are detailed in a 2-color, 20-page bulletin. Unit ratings range from 225-4000 amp. (I-T-E Circuit Breaker Co.)

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Pipe Fittings

In 36 pages, a new illustrated catalog tells about a complete line of stainless-steel pipe fittings. It includes a wide variety of fittings; forged, cast, or machined from bar stock, for service at 150-6000 psi. (Valve & Fitting Div., Cooper Alloy Corp.)

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Blending Fuel Oil

Continuous blending of various grades of fuel oil is the subject of a new application bulletin. It describes methods of blending based on the control of viscosity in the final product. (Fischer & Porter Co.)

For free copy circle No. 11 on postcard

Pumps and Motors

A 12-page catalog describes a line of rotary air motors, air compressors and vacuum pumps. Six sizes of air motors, 1/20-7 hp, are explosion-proof. They also feature variable speed. (Gast Mfg. Corp.)

For free copy circle No. 12 on postcard

Commercial Glasses

Expanded data on corrosion resistance and thermal expansion of 32 commercial glasses are major additions to a newly-revised publication. In its 16 pages the new edition also includes standard sections on mechanical, electrical and optical properties. (Corning Glass Works)

For free copy circle No. 13 on postcard

Draw Furnaces

An attractive looseleaf folder informs readers on the advantages of a line of draw furnaces. It includes photos and text about in-service units along with specifications and available sizes. (Sunbeam Equipment Corp.)

For free copy circle No. 14 on postcard

Cut Handling Costs

This new materials-handling manual presents case studies to show how hydraulic power can be used to cut handling costs, increase production and reduce worker fatigue. The applications cover 21 industry classifications including heavy manufacturing, mining, paper mills, institutions, aircraft assembly, construction and many others. The book features 59 ways to lift, load, position and machine feed more efficiently. (Globe Hoist Co.)

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Indicating Load Cells

This valuable new manual illustrates the many uses of remote-indicating, load-cell systems throughout industry. It also suggests imaginative ideas for new applications not commonly known. (W. C. Dillon & Co., Inc.)

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Salt-Bath Reference

If the heat-treatment process engineer is looking for an easy-to-use reference text on salt baths and chemicals, a new 21-page booklet will fill the bill. It covers a wide range of salt-bath applications including neutral hardening, tempering, austempering-martempering, carburizing, annealing, high-speed quenching and nitriding. (The A. F. Holden Co.)

For free copy circle No. 17 on postcard

Temperature Control

In two colors an illustrated, 64-page, wallet-sized catalog covers a line of electric ovens, furnaces, environmental cabinets and related temperature-controlled equipment. (Blue M Electric Co.)

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Resin Bulletin

With pictures, graphs and data, a new folder presents the story of a recently-developed phenolic resin for industrial and general-purpose elastomer adhesives. Information on tensile shear and peel back is included. (Schenectady Varnish Co., Inc.)

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NEW PATENTS

Nodular Iron

Method of producing nodular iron, L. C. Crome (assigned to The Dayton Malleable Iron Co., Dayton, Ohio), Apr. 18, 1961. In the production of nodular iron castings, a low-carbon gray iron mix is heated to at least 2850°C., tapped off, mixed with about 5 pct of a solid metal to effect sudden chilling, and treated with a nodularizing agent prior to casting. U. S. 2,980,531.

Exothermic Mixtures

Improvements in exothermic mixtures for use in the production of castings and ingots, H. M. Morgan (assigned to Foundry Services International Ltd., Birmingham, Warwickshire, England), Mar. 15, 1961. An improved exothermic composition for use in the production of ingots and castings from killed and semi-killed steels comprises 15-30 pct Al, 45-84 pct Fe oxide, 1-8 pct Cu, and 0-4 pct Ni. Optionally, 1-25 pct fluorspar may be added as a slag-fluxing agent. British 863,-038.

Magnetic-Steel Strip

Method of producing improved magnetic-steel strip, J. G. Ford, T. J. Murrin and J. H. Bramble (assigned to Westinghouse Electric Corp.), Apr. 18, 1961. This method subjects magnetic-steel strip to a hot-roller leveling treatment. A soaking heat treatment follows to produce improved flatness and magnetic properties. U. S. 2,980,561.

Iron-Ore Reduction

Reduction of iron ore, P. S. Viles (assigned to Esso Research & Engineering Co.), Apr. 4, 1961. In the fluid-bed reduction of taconite or other iron-oxide ores, the ore is admixed with cobalt molybdate or other catalyst metal compound. Then this mixture fluidizes and contacts a hydrocarbon gas. The hydrogen and carbon monoxide formed in the reaction zone effect the reduction. Canadian 617,850.

Long-Lived Tools

Ferrous alloy and its products, S. G. Fletcher and R. P. Kells (assigned to Latrobe Steel Co.), May 9, 1961. A high-speed, long-life tool steel comprises preferably 0.75-1.5 pct C, not over 0.75 pct Si, not over 1 pct Mn, 0.1-0.3 pct S, 0.5-11 pct Mo, 3.9-9 pct Cr, 0.5-5 pct V, up to 20 pct W, and the remainder Fe and incidental impurities. U. S. 2,983,601.

Iron Making Method

Method of making pig iron and producing malleable iron, C. L. Altenburger (assigned to National Steel Corp.), May 16, 1961. To improve the characteristics of pig iron or white iron, the right amount of rasorite is added to the melt. U. S. 2,984,564.

Aluminum-Iron Alloys

Improvements in aluminum-iron alloys (assigned to Westinghouse Electric Corp.), Mar. 15, 1961. An alloy member with improved magnetic properties is made by annealing an article consisting of 14-17.5 pct Al and the balance Fe. It's done in a dry-hydrogen atmosphere at 1150-1300°C. Then cool and quench the member. British 863,-047.

Stainless Steel

Stainless steel and method, H. Tanczyn, May 16, 1961. A fully-austenitic, heat-hardenable stainless steel consists of 12-18 pct Cr, 15-30 pct Ni, 3-6.5 pct Si, 1-4.5 pct Mo, up to 3 pct each of Cu and W, up to 1 pct Cb, up to 0.2 pct N, and the balance essentially all Fe. U. S. 2,984,563.

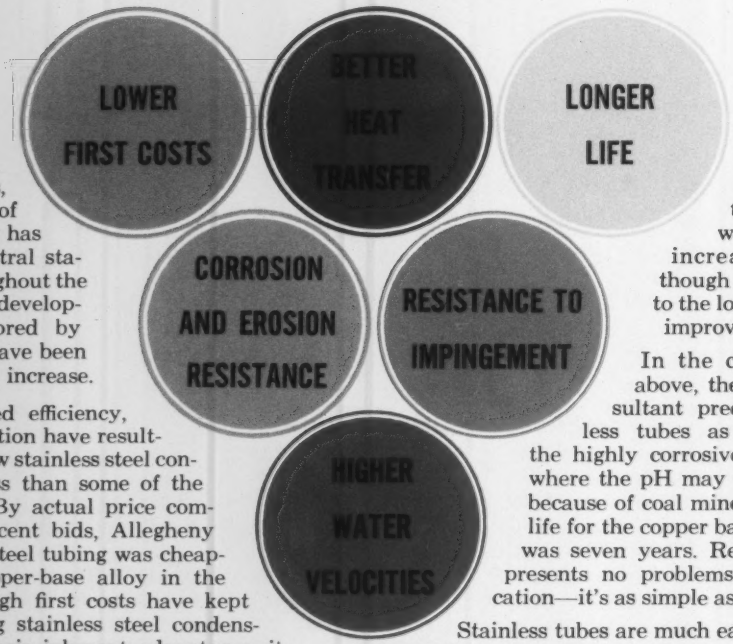
Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

. . . for an example of Allegheny Stainless at work in a specific market application.

Check the next two pages which also appear in the June issues of POWER, COMBUSTION, and CORROSION.

It's just another case of Allegheny Stainless at work for you . . . in your products . . . in your markets . . . in your merchandising efforts.

NEW DEVELOPMENTS IN ALLEGHENY STAINLESS STEEL CONDENSER TUBES MEAN



In the last three years, over 3 million feet of stainless steel tubing has been installed in central station condensers throughout the United States. New developments, many sponsored by Allegheny Ludlum, have been responsible for this increase.

Automation, improved efficiency, and increased production have resulted in lower prices. Now stainless steel condenser tubes cost less than some of the copper alloy tubes. By actual price comparisons on some recent bids, Allegheny Type 304 Stainless Steel tubing was cheaper than a usual copper-base alloy in the same diameter. If high first costs have kept you from considering stainless steel condenser tubing with all their inherent advantages, it will pay you to re-investigate.

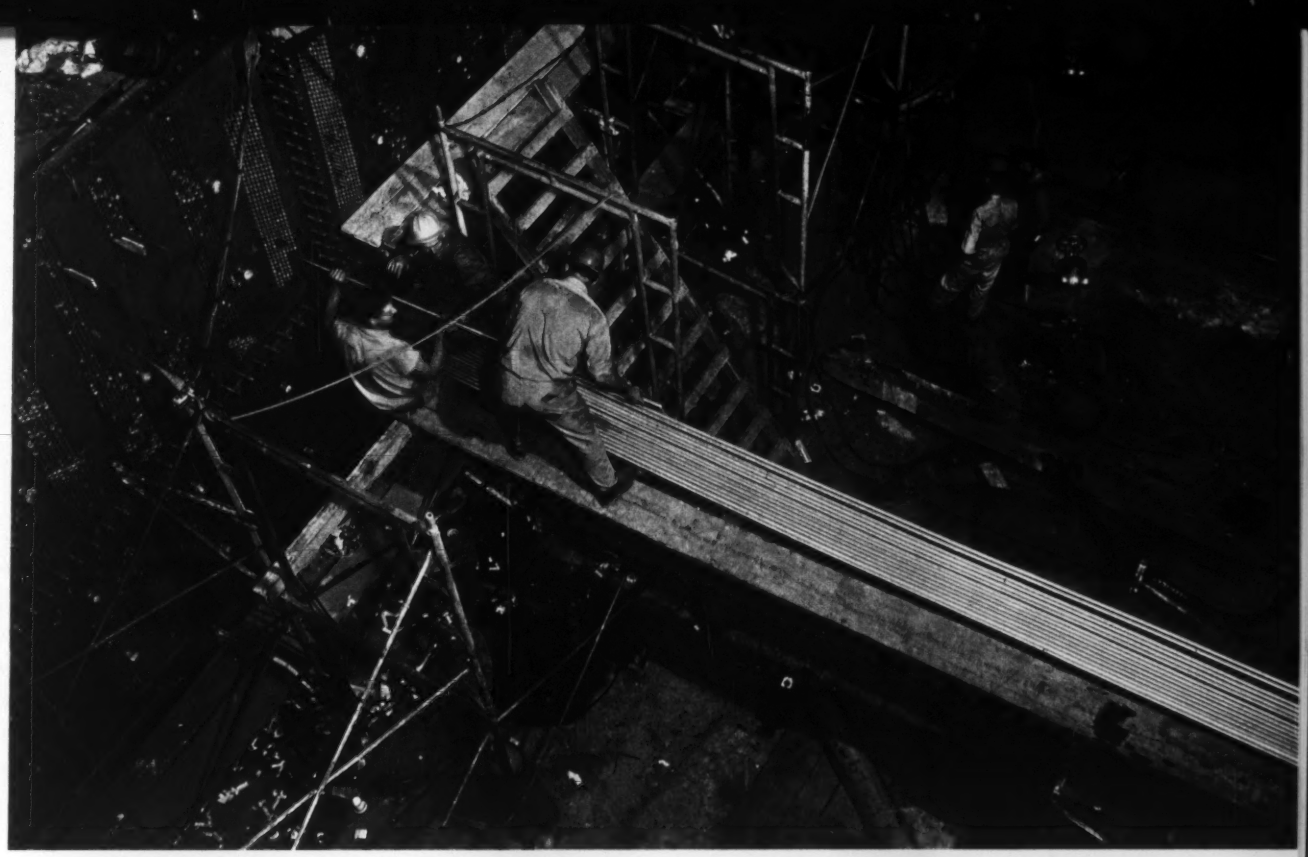
Increased operating data have shown that the in-use heat transfer rates on condenser tubes are much superior to the published data of a decade ago. Exhaustive tests made at a condenser completely re-tubed with Allegheny Type 304 Stainless Steel in May 1958 showed that the actual over-all heat rate on the turbine was improved over the 88-10-2 copper tubes previously used. Part of the answer is the thinner wall possible in the stainless tubing, 22-Bwg, compared with the 16-Bwg copper alloy tubing formerly used.

The superior strength of stainless allowed these thinner walls. In spite of the larger inside diameter, cooling water velocity through the tubes averaged ½ FPS more in stainless, although the pumping facilities were not changed. This increase in velocity, even though the ID is larger, is due to the lower flow resistance and improved interior cleanness.

In the condenser mentioned above, the utility and their consultant predict the life of stainless tubes as thirty years despite the highly corrosive river water involved where the pH may vary from three to six because of coal mine drainage. Previously, life for the copper base tubes formerly used was seven years. Re-tubing with stainless presents no problems, calls for no modification—it's as simple as re-tubing with copper.

Stainless tubes are much easier to clean than copper alloy tubes. They are harder and tougher. The mud and slime do not cling to the surface. With copper tubes, it was impossible to clean these condenser tubes without using oversize cleaning plugs which would have affected tube life. Practical cleanliness of copper tubing averages less than 60%. After re-tubing with Allegheny Stainless, one shot with nylon brushes restored cleanliness to the as-new condition.

Another major trend is the partial use of stainless tubes to resist excessive steam-side erosion. Many condensers are being specified or re-tubed with stainless tubes in the outer banks to resist blasting action or steam impingement. Generally, approximately 5% of the total tubes are specified stainless for the periphery. Even here, 22-Bwg stainless is usual where 18-Bwg or less is necessary in the copper alloys.



Retubing the air removal section of this condenser with Allegheny Stainless Tubes eliminated attack by the high ammonia content of the non-condensibles.

Another trend is the use of stainless in the air cooler or residual condenser section. Copper tubes tend to stress crack and fail because of the ammines used for water purification. Under these conditions, stainless tubes remain unaffected even under excessive build-up of ammonia in the non-condensibles.

On the horizons in heat transfer equipment design is an all stainless steel condenser that will result in an overall size reduction. With the higher strength and the less resistance to water flow of stainless tubes, water velocity through the tubes can be doubled. Erosion and corrosion can be virtually eliminated. Right now, several consulting firms are evaluating this latest development.

Stainless steel condenser tubing is welded from high quality stainless steel strip on automatic machinery. After fabrication, they are cold drawn to increase strength and improve finish. Stainless steel condenser tubes are guaranteed against preferential corrosion attack at the weld. They can be rolled or welded into the tube sheet with the same equipment and procedures as with copper alloys. At the tube sheet, stainless steel resists oxygen release. There are no galvanic problems.

The trend to stainless steel condenser tubes is growing by leaps and bounds. For more facts, details, and general information, contact the nearest Allegheny Ludlum representative or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

No deterioration after 17 years of operating tests in river water made highly corrosive by coal mine drainage resulted in the selection of Type 304 Allegheny Stainless for the tubes in this condenser unit.

ALLEGHENY LUDLUM AL®

A-L products: stainless, high-temperature, electrical and tool steels; magnetic materials, and Carmet Carbides

2863

New Equipment and Machinery

Production Methods Improve Machine-Tool Bed

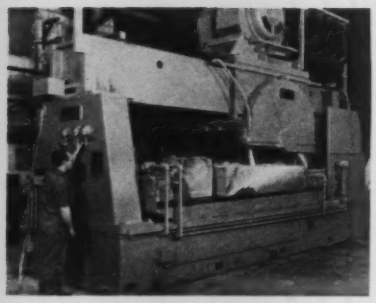
By using its own tooling concepts, a machine-tool manufacturing company reduced handscraping on a 24-ft, 38,000-lb cast-iron machine bed by about 50 pct. Combining all elements for machining also cut production time some 60 pct. The bed, for a new line of 5-in. milling machines, winds up flat within tenths. Basic accuracy is 0.0001 in. per ft for straightness and surface alignment. However, hand scraping is still necessary to provide oil pockets on the bedway surfaces. (DeVlieg Machine Co.)

For more data circle No. 59 on postcard, p. 157

Electronic Inspection Device Gages Tiny Holes

An all-new inspection machine measures a hole only 0.0001 in. in diameter for size, taper and bellmouth. Just as important, it does this on a production basis. Its single-gaging stylus and electromagnetic sensing mechanism account for this remarkable capability. Where can you use it? Several expected applications include measuring holes and other types of cavities in precision parts, miniature bearings and missile and servo-valve components. The instrument is believed to be the first manufactured unit capable of checking holes this size. (The Sheffield Corp.)

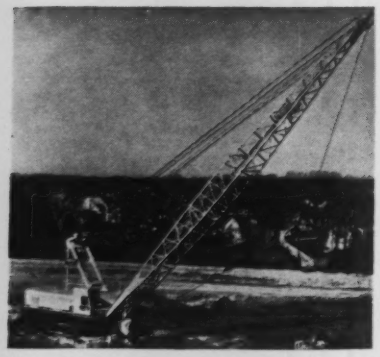
For more data circle No. 60 on postcard, p. 157



Giant Circular Saw Slices Solid Aluminum Slabs

With the development of this automated cold-sawing installation, large aluminum-alloy billets and slabs are no longer a cutoff problem. It cuts fast, holds close tolerances, and provides smooth surfaces. The new equipment centers around the saw itself, a hydraulically - operated, high - speed unit. Equipped with up to 100-in. blades, the saw takes on 36-in. diam billets and slabs up to 20-in. thick x 80-in. wide. A 200-hp, 2-speed motor drives the saw at 3000 or 6000 fpm, depending on the alloy that's being cut. (The Loma Machine Mfg. Co., Inc.)

For more data circle No. 61 on postcard, p. 157



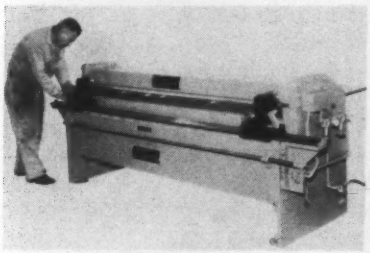
Heavy-Duty Dragline Handles 10-Cu Yd Buckets

Elimination of friction clutches for all cyclic functions is a key feature of this new diesel-electric dragline and clamshell. Instead, static controls govern independent eddy-current clutches which regulate hoist and drag as well as the holding and closing motions. This system promotes high production and low maintenance. The new machine takes boom lengths of 100, 120 and 140 ft. It also embodies modern design and manufacturing techniques. For instance, oil pumps provide positive lubrication to the gears and bearings at all times. Also, unitized construction eases assembly and assures correct line-up of shafts and bearings. To aid the operator, an elevated cab lets him see the work. (Bucyrus-Erie Co.)

For more data circle No. 62 on postcard, p. 157

Fuze-Weld Thin Metals

This roll shear-flanging machine may be the key to thin metal welding. Teamed up with a precision butt welder, it makes it easy to ob-

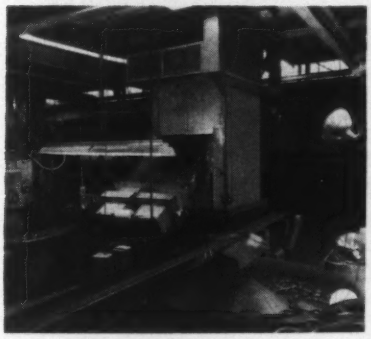


tain a full-strength, butt-fusion weld on foil-thickness metals. Accurate shearing and flanging is the crux of the problem. (Airline Welding & Engineering)

For more data circle No. 63 on postcard, p. 157

Magnetic Conveyor

To speed connecting-rod handling in an automotive plant, a conveyor picks up the interlocking rods out of a skid box at a constant rate. The rods are elevated at a rate of 5000 lb per hr. The conveyor has two heavy-duty de-magnetizers to eliminate the residual magnetism. Advantages of this method include: Untangling of the connecting rods,



no possible spillage, self-cleaning that allows a change of parts at will and versatility. (Prab Conveyors, Inc.)

For more data circle No. 64 on postcard, p. 157

Inspects Magnets

Operating at speeds up to 1200 parts per hr, a new machine gages the length and diameter of magnets. It also sorts them into accept and reject categories, automatically. Quick adjustments let the checker handle

Knockout punch! In seconds, fire can have your business on the ropes. Keep your guard up by protecting storage rooms for volatile solvents, gases, flammable liquids with a *fully-automatic* Kidde carbon dioxide extinguishing system. U.L. and F.M.-approved Kidde systems actuate at the first flash of fire, smother it in seconds, leave no mess, turn off power and sound an alarm. Kidde's 35 years' experience can help you protect *any* hazard. Write today and find out how.

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.
649 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal — Toronto — Vancouver

NEW LENOX MASTER-BAND ALLOY STEEL BAND SAW BLADE

Dramatic increase in blade life, cutting rate, and square inches of cutting per blade!

This special alloy steel band saw blade with the Lenox True-Weld, substantially reduces cutting costs by cutting at a faster rate, eliminating several blade changes, increasing square inches of cutting per blade, and by cutting tougher steels.

Master-Band is designed and engineered for *both* conventional and automatic machines, with an immediate 25% savings in blade cost on automatic cut-off equipment.

Master-Band IS DESIGNED FOR THESE STANDARD BAND SAW MACHINES

JOHNSON • LAIDLAW • MARVEL
KALAMAZOO • DoALL • NAPIER
GROB • WELLS • W. F. WELLS
• AND OTHERS

AND THESE AUTOMATIC CUT-OFF MACHINES

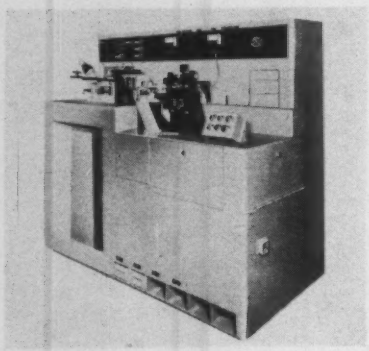
DoALL • MILBAND-THOMPSON
MARVEL • PEERLESS • WELLS
• KALAMAZOO • AND OTHERS

Write for performance guaranteed trial order or call your industrial distributor.

LENOX
THE TOOLS IN THE BLUE BOX

AMERICAN SAW & MFG COMPANY
SPRINGFIELD, MASSACHUSETTS, U.S.A.

various part sizes. But these are not all the benefits. Because it uses standard gage heads and electronic



modules, reliability is tops and maintenance is easy. (Radio Corp. of America)

For more data circle No. 65 on postcard, p. 157

Medium-Size Welder

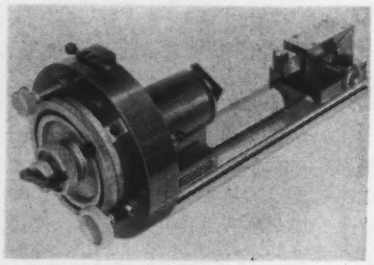
Here's a new unit that fills the need for welder performance between high-capacity, production-welding equipment and small 180-amp shop machines. It's a 225-amp arc welder offering metalworking shops output capacity and electrode selection formerly available only in larger industrial models. Dial-type current control provides quick adjustment and positive setting over a range from 40-225 amp. Electrodes

from the smallest to 3/16 in. diam can be used to weld material of any thickness. (The Lincoln Electric Co.)

For more data circle No. 66 on postcard, p. 157

Index Centers

Finer tolerances in inspection work on centers is a reality with a new precision index center. The newcomer also achieves peak precision on form grinding of spiders, splined punches, gear punches and dies, and sectional parts of dies, where revolving the part on centers or in a spindle is necessary. Several features account for this performance. First, an extra plug-in-station allows the user to turn his workpiece exactly 180° at any time to get his work on dead center. It can also be used to reorient for a different set of angles on the same workpiece. Then there's an accurately-adjustable tail stock. Center-line-up is maintained with a lapped-fit ram movement of the center. Also, the offset tailstock construction allows wheel clearance when



slot-grinding. Sealed against dirt, the new index center also suits wet grinding. (Moore Special Tool Co., Inc.)

For more data circle No. 67 on postcard, p. 157

Walk-In Ovens

A new line of walk-in production ovens fills a need for stock equipment that was previously a custom-made proposition. It supplements an existing line of these units. The new ovens rate at 850°F and are available in six models from 250,000-1,500,000 Btu per hr. The heaters burn gas, oil or electricity. Each oven has two swing doors, gravity exhaust stack, an approved safety system and indicating controls. Interior dimensions range from 4.5 x 6 x 6 ft to 8 x 12 x 6.75 ft. (Despatch Oven Co.)

For more data circle No. 68 on postcard, p. 157

Bench-Model Saw

Here's a low-cost abrasive saw with all the high quality of large-capacity, higher-priced, standard models. It employs all sizes of abrasive wheels up to a maximum of 20

DENSE FUMES

ON JOB REMOVED BY 'BUFFALO' HYDRAULIC SCRUBBING TOWERS

Here's how an aircraft plant solved a critical contaminant problem. 35,000 and 50,000 ton hydraulic, closed die forge presses are used to produce large aluminum components for the aircraft industry. Fumes (dense smoke, oil mist and graphite particles) are released as the presses are operated.

Four specially-designed 'Buffalo' Hydraulic Scrubbing Towers were utilized. Each is rated at 65,000 CFM and 1.5" w.g. The spray system recirculates 250 GPM at 100 psi.

Before installation, the entire work area was completely covered with an oil slick. The stack effluent was termed a nuisance. Since installation, the work areas are clean. The stack effluent is negligible. Operation of the 'Buffalo' Hydraulic Scrubbing towers and laminates over 90% of the contaminants.

Component parts of the 'Buffalo' Hydraulic Scrubbing Tower are: A) Collection and Droplet Elimination Section. B) Quick-opening nozzle latches with flexible piping. C) Vertical Risers. D) Inlet. E) Spray manifold ring. F) Particle conditioning section. G) Waste outlet.

'Buffalo' Hydraulic Scrubbing Towers are high efficiency, wet centrifugal air cleaning devices specially designed to solve your fume removal problems.

They utilize : 1) A finely atomized spray system for particle conditioning. 2) Inertial separation of the contaminant from the gas stream in a cylindrical tower.

Whatever your air pollution problem, call in your 'Buffalo' resident engineer. He will be glad to help you solve it — efficiently, economically.

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

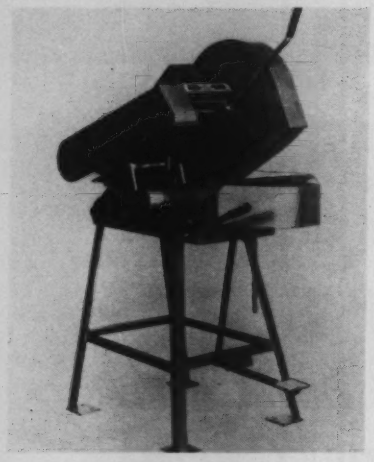
'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

in. It cuts up to 6-in. pipe and shapes, and 4-in. solids in ferrous or non-ferrous materials. This lightweight, portable model mounts on



a bench with a lever-controlled chain vise, or on a stand with a foot-pedal assembly. The latter option leaves the operator's hands free. (Collins Machinery Corp.)

For more data circle No. 59 on postcard, p. 157

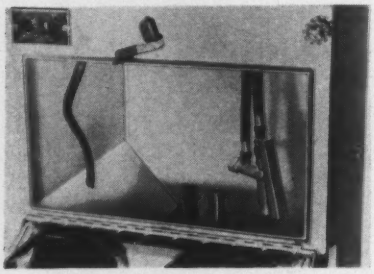
Measuring Machine

This versatile machine supplies fast, precise measurements. It finds the location of holes and surfaces in two dimensions. But, in contrast to tedious checking on surface plates, lighted numerals display the X and Y coordinates simultaneously. This means reliable results. It also speeds the work. All the operator must do is record the direct digital readings. Then, he adds or subtracts to get the answer. But, that's not the whole story. When you substitute a scribing tip for the probe, the unit doubles as a layout machine. Accuracy of ±0.001 in. is guaranteed. (The Sheffield Corp.)

For more data circle No. 60 on postcard, p. 157

Wet-Blast Cabinet

Fabricated of stainless steel, a new wet-blasting machine fights the corrosion normally associated with the process. Within the cabinet interior, the expanded metal work table measures 22-in. wide x 21-in. deep. A self-contained blower evacuates the mist created by wet blasting. In addition, a large viewing window at the front of the cabinet lets you check the agitation system in operation. It's a mechanical sys-

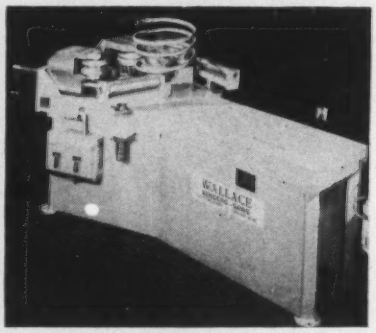


tem, instead of the usual compressed air method. Thus, you can use the new machine in shops where the compressed-air supply is marginal. (Pressure Blast Mfg. Co., Inc.)

For more data circle No. 61 on postcard, p. 157

Roll-Bending Machine

The first roll-bending machine in a line takes up to 2-in. pipe. It rolls pipe, tubing, and square, round or flat bars into coils. Or, it can make tight-radius or loose-radius bends. One significant advantage is that one set of pipe rolls, per pipe size,

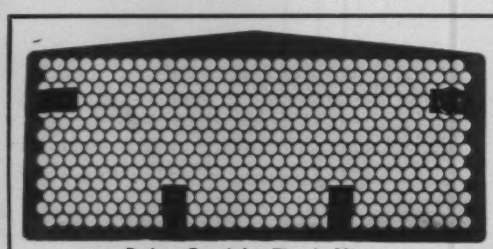


is equivalent to more than a dozen sets of fixed-radius dies. (Wallace Supplies Mfg. Co.)

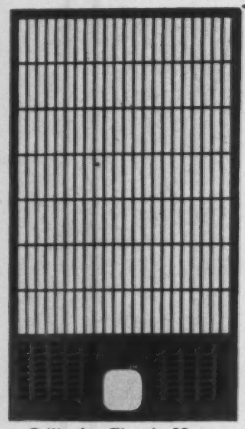
For more data circle No. 62 on postcard, p. 157

Automated Turret Drills

Now, the Sperry Gyroscope numerical-control system has been adapted to a line of 6- and 8-spindle, turret-drilling machines. This brings to 10 the number of major manufacturers offering their control systems for automatic operation of the line. The Sperry unit employs linear-coil transducers to pinpoint measurements that deter-



Rodent Guard for Electric Motor



Grille for Electric Heater

THEY SAVE MONEY
by letting
"DIAMOND" DO IT

For nearly half a century we have been furnishing perforated metal sheets, plates and parts to manufacturers of industrial equipment and household appliances, at lower cost than if the work were done in their own shops. No magic — just because we are especially equipped and organized for that type of work.

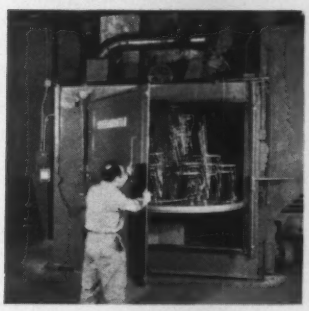
Let us quote on YOUR requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions and always welcome an opportunity to do so.

Our new 32-page catalog illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern applications. Write for Catalog 59. No charge or obligation.

DIAMOND MANUFACTURING CO., WYOMING (Wilkes Barre Area) PENNA.

Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

3 minute blast adds years to life of finish



Approximately 30 wrought iron chair frames, plus other furniture components are thoroughly blast cleaned in only 3-minute cycles in this Wheelabrator Swing Table, giving superior results in a fraction of the time formerly required for manual cleaning.

A demonstration of WHEELABRATOR'S

VITAL VALUES

Cost savings are only half the story of the benefits gained by Contempo Frames Co. of Brooklyn, N.Y., since installing a Wheelabrator Swing Table to blast clean metal furniture frames prior to finishing. While production capacity for this work has been multiplied 5 times, the greater benefit has derived from the superior finish now obtained. The uniformly roughened and thoroughly clean surface provides an ideal base for electrostatic enameling, giving smoother, more uniform paint coverage, and vastly improved adhesion to the base metal. The ability to add such sales benefits to a product, while cutting manufacturing costs, is typical of the Vital Values you get with Wheelabrator Airless abrasive blast cleaning.

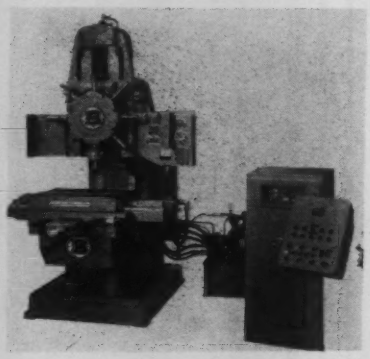
VITAL VALUES FOR INDUSTRY

WHEELABRATOR

AIRLESS BLAST EQUIPMENT

WHEELABRATOR CORPORATION, 510 S. Byrkit St., Mishawaka, Indiana. In Canada, WHEELABRATOR CORPORATION OF CANADA, LTD. 1901 Birchmount Rd. P.O. Box 490, Scarborough, Ontario
A subsidiary of Bell Intercontinental Corp.

mine the final X-Y positions of the table. The turret drills themselves are made to handle from ¾-1½-in.



drills in steel. Individual spindle speeds, feeds and depths of cut are preselective. They automatically shift when the turret indexes. (Burgmaster Corp.)

For more data circle No. 63 on postcard, p. 157

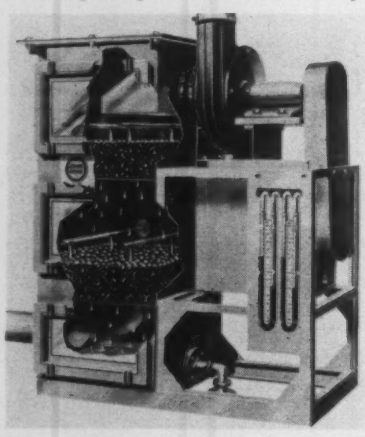
Features Dual Tables

A new, dual-table, contour grinder uses a 3-dimensional master. In operation, an electro - hydraulic tracer system follows the master on one table to produce a duplicate, within 0.0005 in., on the other. The grinder embodies some built-in advantages. In the first place, vertical design eliminates the deflection of the workpiece inherent in horizontal machines. Secondly, the upright configuration reduces floor-to-floor time, since parts load easier and center faster. The tracer system is also of interest. It has a transistorized electronic control for compactness. The hydraulic part of the system guides both the vertical and horizontal travel simultaneously through 180° of motion. During this travel, stock removal is constant on all surfaces. (The Kaydon Engineering Corp.

For more data circle No. 64 on postcard, p. 157

Flooded-Bed Scrubber

To eliminate fumes, mists, vapors and light dusts from processing gases a new scrubber uses an unusual principle. Two packed beds, each flooded with a scrubbing liquid, sustain intimate and continuous contact between the contaminated gas and the scrubbing medium. The nature and the energetics of the surfaces activate the scrubbing action at the contact area. Thus, the concentration of molecules at the interface between gas and liquid is intensified by the high-pressure relationship between the gas phase and liquid phase. The instantly-

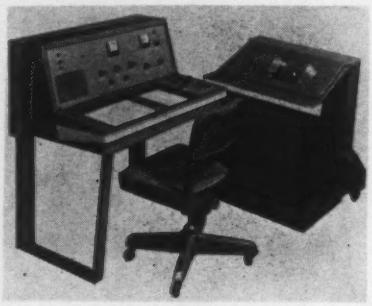


saturated surface constantly turns and continuously exposes a new and uncontaminated surface for continued molecular adsorption. Unusually-high efficiencies, in excess of 90 pct, are the result. The scrubber removes such toxic and corrosive fumes as NO, NO_2, hydrochloric-, nitric- and sulphuric-acid vapors. (Air Pollution Control Div., John Wood Co.)

For more data circle No. 65 on postcard, p. 157

Spectrometer System

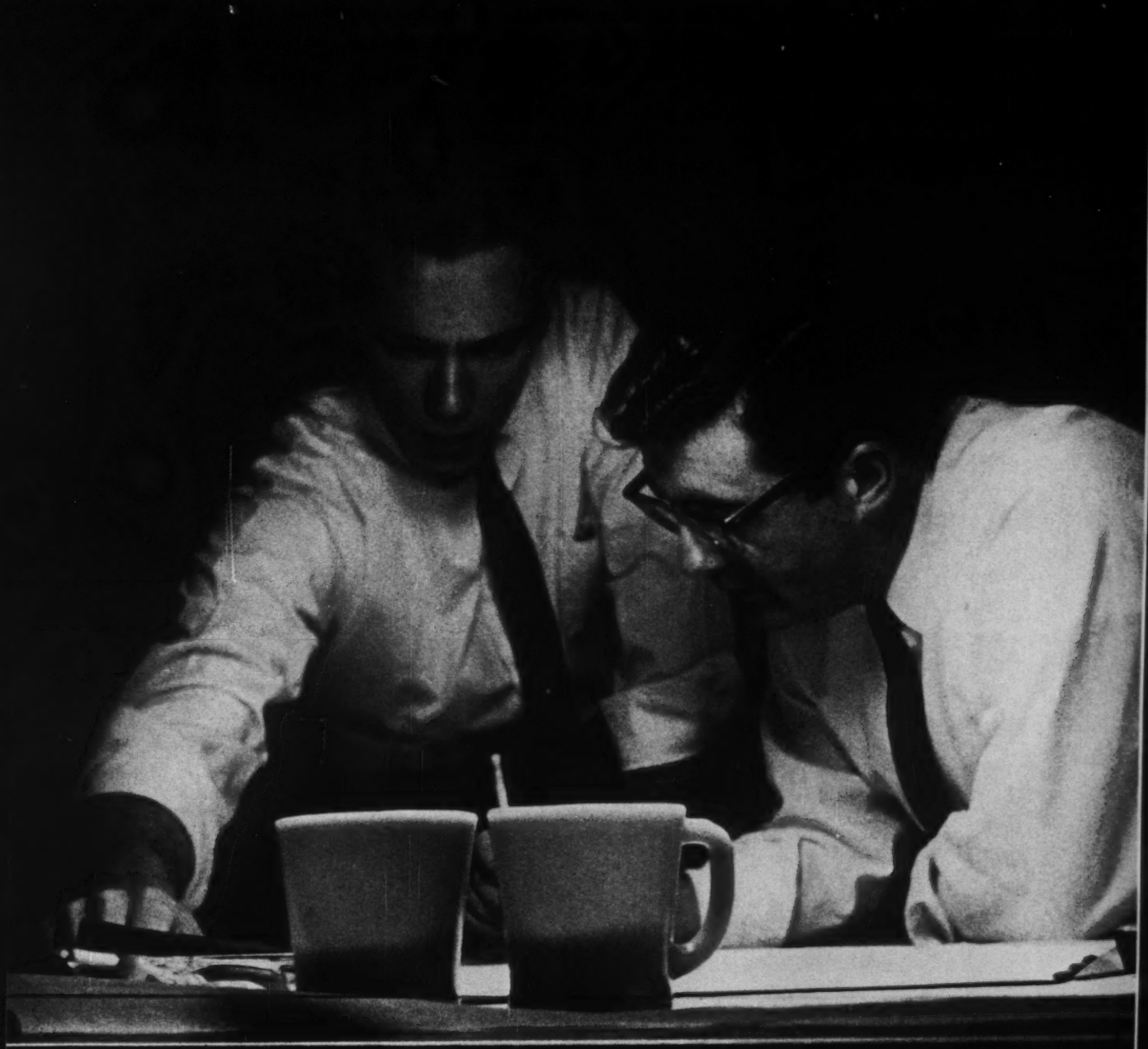
By the technique of nuclear-magnetic resonance, a new analyti-



cal spectrometer system performs qualitative and quantitative analysis of organic compounds. The instrument is sensitive to the H_2 nucleus at an operating frequency of 60 megacycles and magnetic-field strength of 14,092 gauss. Typical volume of a liquid sample is 0.2-0.4 cc. The instrument can resolve two lines separated by one part in 10^8. Its built-in integrator provides the information necessary to calculate the area under the NMR spectra for quantitative measurement. This information appears on a chart calibrated in both ppm and cycles per second. (Instrument Div., Varian Associates.)

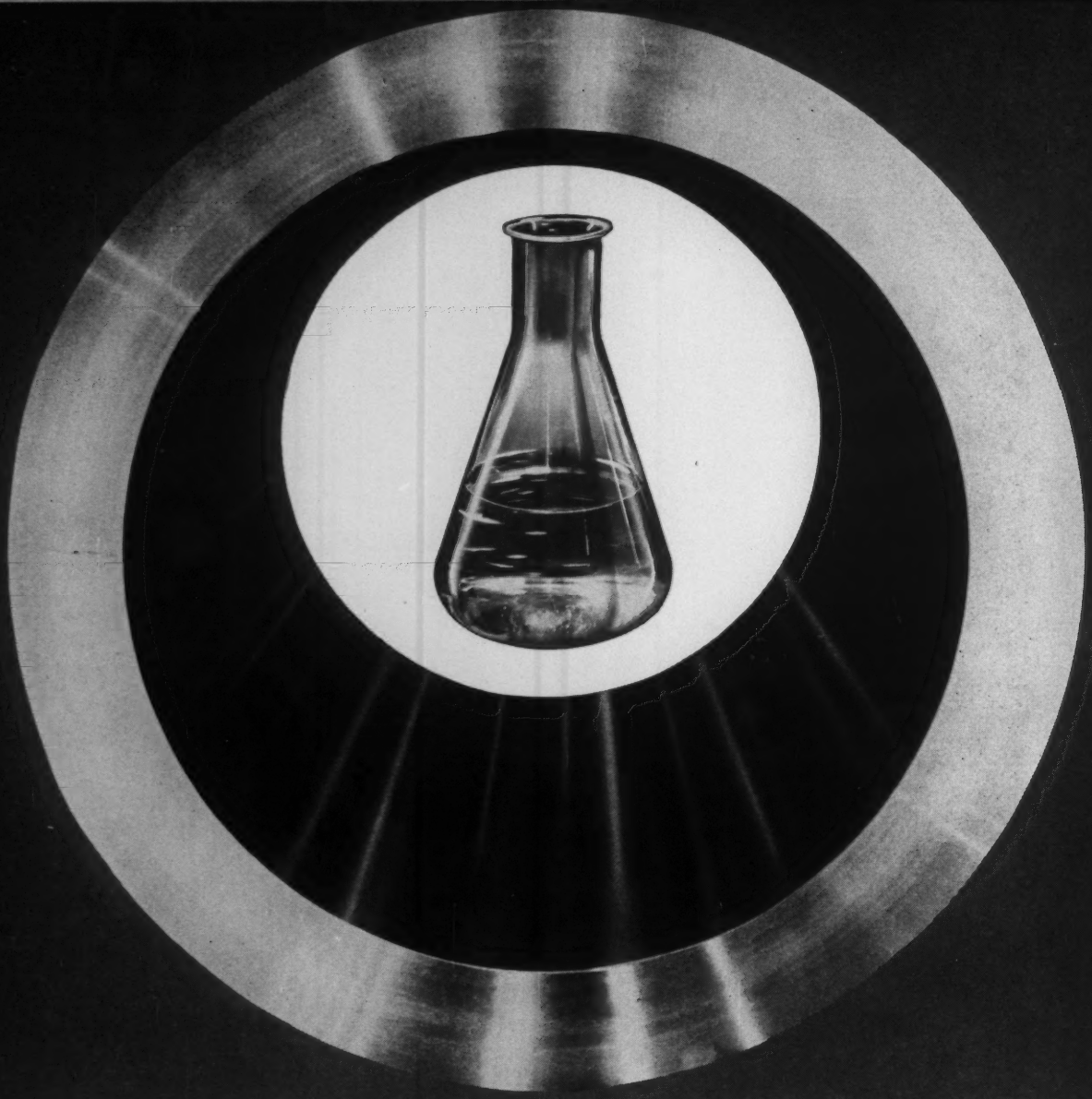
For more data circle No. 66 on postcard, p. 157

INITIAL PINCH TYPE PLATE BENDING ROLL
Capacity
to 6 inch plate cold
The LARGEST
ever built
Our Line
Light and heavy machinery for all classes of sheet metal, plate and structural work
BERTSCH & COMPANY, CAMBRIDGE CITY • INDIANA



How To Engineer A Better Product Finish...FOR TOMORROW

Where product or component finishes involve critical limits—in areas of tolerance, unit-cost or rate of production—abrasive engineering discussions often continue late into the night. And, whether the subject be planning for a new product or a cost-reduction problem on current production—*the man to sit in with you is your Carborundum field engineer.* He brings to your office a tremendous accumulation of practically tested abrasive knowledge and experience. Trained in all major abrasive methods employing either belts, discs, wheels, abrasive grains and powders—he recommends impartially. For maximum efficiency with abrasives, this help is always available from your Carborundum district office. A phone call will do. **CARBORUNDUM**



FORMULA FOR FLEXIBLE ANALYSES

LOOKING FOR A SPECIAL COMPOSITION in your steel tubing... perhaps in limited quantities? Then ACIPCO is the ideal source! Here are complete facilities plus the newest process*... ACIPCO CERAM-SPUN®... for producing centrifugally spun tubes to meet the most rigid specifications.

CONSIDER THESE ADVANTAGES: 1. Electric furnaces, both arc and induction type, are available in a variety of capacities... heats can be sized to produce the exact footage required. **2.** With minor modifications for castability, all carbon and low alloy steels can be furnished in compliance with the chemical composition limits of SAE and AISI Standards. Special ferritic chromium-molybdenum alloy steel tubes are manufactured to meet the requirements of ASTM Specification A426-58T. **3.** All ACI corrosion resistant and heat resistant alloys... as well as Cast Monel and ARMCO 17-4 PH.. are available. **4.** Also, gray and alloy cast iron and all grades of AMERICAN DUCTILE IRON® (including the austenitic grades) are regularly cast as pipe, tubes, fittings and specials in all sizes and thicknesses.

IN ADDITION, ACIPCO offers a wide range of sizes, with O.D.'s from 2.25″ to 50″. Wall thicknesses vary from .25″ to 8″; as-cast lengths from 4 feet to 20 feet; longer lengths can be made by welding.

If you design, manufacture or use parts requiring tubular metal components, it will pay you to investigate the other advantages ACIPCO offers. For complete facts, contact ACIPCO STEEL PRODUCTS, Division of American Cast Iron Pipe Company, Birmingham 2, Alabama.

*Patent applied for

ACIPCO CERAM-SPUN®
STEEL TUBING

Steel Prices Continue Shaky

For the most part, recent price cuts have not hit major carbon steel tonnage products.

But upgrading and price shading continues and price levels are still far from stable.

■ Steel prices continue vulnerable in spite of new efforts by major producers to assure stability of prices of leading tonnage products.

In the wake of a series of price cuts of varying importance, these conclusions can be drawn:

1. Most price cuts were made in official recognition of market conditions that had existed for some time —in some cases for a period of months.

2. Products that were involved in price cutting are, for the most part, products that are chronically vulnerable to reductions. Cuts do not represent any new weakness.

More Cuts Coming?—3. Prices of standard grades of linepipe will have to be dropped to bring them back to a realistic position compared with premium grades, which were cut to lower levels.

4. Price shadings through overgrading continue for major tonnage items, although at least two major mills insist they have not taken part. They contend there is no new trend to price cutting, particularly in standard carbon steel products.

5. Recent price developments are beginning to hurt the current steel market. Many steel buyers are holding back against possible spread of steel price cutting.

Meeting Competition—Although products involved in price cutting to date are not called major tonnage items, the combined total of linepipe, stainless and reinforcing bars does add up to a substantial share of the market, both in tonnage and dollar value.

In addition, price developments in the past weeks show that the major producers, although determined to stabilize prices, will cut where their share of the market is threatened by price cutting or shading of others in the industry.

This was indicated in linepipe. A major producer, although aware of cutting elsewhere in the industry, did not move as long as it obtained a share of the business. But when shut out of a major project, it cut its prices.

July Is Slipping—On the overall steel market, orders for July are slipping a bit. The drop is about what could be expected for the annual summer letdown. But some mills report they are running almost 10 pct behind the June level for July. Steel production, however, is likely to stay close to present levels.

This is not alarming. July will absorb the brunt of plant vacations, part of the automotive downtime for changeovers to 1962 models, and the general seasonal apathy in demand for heavy durable goods.

Question Marks — Overall demand for most products continues strong, but a few question marks are appearing: Because of poor financial showings, railroads continue out of the market; oil country goods continue to lag; the housing market continues slow, affecting appliances and other associated consumer products; tinplate orders for July are running behind and inventories are building up at the mills as consumers hold back on releases.

In the important automotive steel market, signs are inconclusive. But June is shaping up possibly 10 to 15 pct over May in steel orders. First orders of steel for 1962 models will be for July.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	98	102	108	101
Buffalo	100	108	118	88
Pittsburgh	92	95	93	89
Youngstown	94	100	98	72
Cleveland	120	126	123	111
Detroit	137	138	134	119
Chicago	112	115	113	96
Cincinnati	113	122	116	90
St. Louis	118	119	122	94
Southern	119	111	104	96
Western	119	124	128	106
U. S. Index	106.6	109.6	109.3	95.3

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,985	2,042	41,168	57,137
Ingot Index				
(1957-59=100	106.6	109.6	92.1	127.8
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$37.83	$37.83	$36.50	$31.00
No. 2 bundles	$24.83	$25.17	$24.17	$20.83

Should Buyers Look Overseas?

L. J. DeRose, a leading purchasing authority, told PA's recently that there are times when overseas buys are wise.

But, he says, it takes an experienced man to shop in the foreign marketplace.

■ More and more purchasing agents are going overseas to find sources of supply. But there are many who refuse to buy anything outside of the United States. According to a leading purchasing authority, those refusing to go abroad are "acting emotionally and in non-economic terms."

L. J. DeRose, president, DeRose and Associates, told PA's attending the annual convention of the National Assn. of Purchasing Agents in Chicago recently: "Buyers must advance their knowledge of changing markets and technologies.

"It means they must improve their skills of analysis and negotiation to master the demands of today's business."

A Responsibility — Mr. DeRose pointed out that overseas buying is the responsibility of the PA if foreign sources can best serve the company. "Buyers," he said, "must pursue constantly their search for value—objective value—wherever and whenever it can be obtained."

The management consultant listed the arguments against buying overseas: (1) It denies American workers jobs and livelihoods. (2) It promotes economic and social instability and aggravates regional and technological unemployment. (3) It encourages indiscriminate price-cutting and invites a return to cut-throat competition and sweat-shop practices.

Lacking Experience—He added that "It's probable that the attitude of American buyers toward foreign sources stems from a lack of personal and business experience in overseas markets."

Mr. DeRose noted American industry is able to compete when it has the will and ingenuity to do so. "By and large, it's doing so right now, and in the foreign competitors' own backyard."

As a challenge to purchasing men, he pointed out: "No longer does American enterprise respond spontaneously to market demands. And no longer is willingness to take a risk a trait to be encouraged. Everyone is playing it safe. . . ."

Why Overseas? — After telling why many buyers weren't going overseas, Mr. DeRose told the reason that some are buying from foreign sources. "Simply and factually, buyers are going overseas because they are unable to obtain from American sources necessary purchase values. Low price and excellence of workmanship are fast disappearing from the American scene."

But, he warned the PA's, purchasing abroad has problems. Among these he listed: (1) The business problems of language and custom which complicates the task of long-distance communication. (2) Differences in quality standards, inspection methods and trade terms. (3) Tariff complexities, shipping terms, and insurance provisions.

"All of these increase the risk of doing business abroad.

"Indeed, where buyers have gone overseas merely for low price and ignored these complexities, they have failed to satisfy important purchasing considerations. When price-buying is done overseas, it frequently proves disastrous."

'Clear and Unequivocal' Aims . . .

Mr. DeRose believes the purchasing agent plays an important role in American industry. And he believes U. S. industry should have certain "clear and unequivocal" aims in the face of foreign competition. Among these aims, he lists:

(1) **Reduce costs** wherever and whenever possible. Justify costs only when they contribute value to the product, customer, or the market.

(2) **Eliminate the frills** and cushions that the war and post-war years have encouraged in engineering, manufacturing, and marketing.

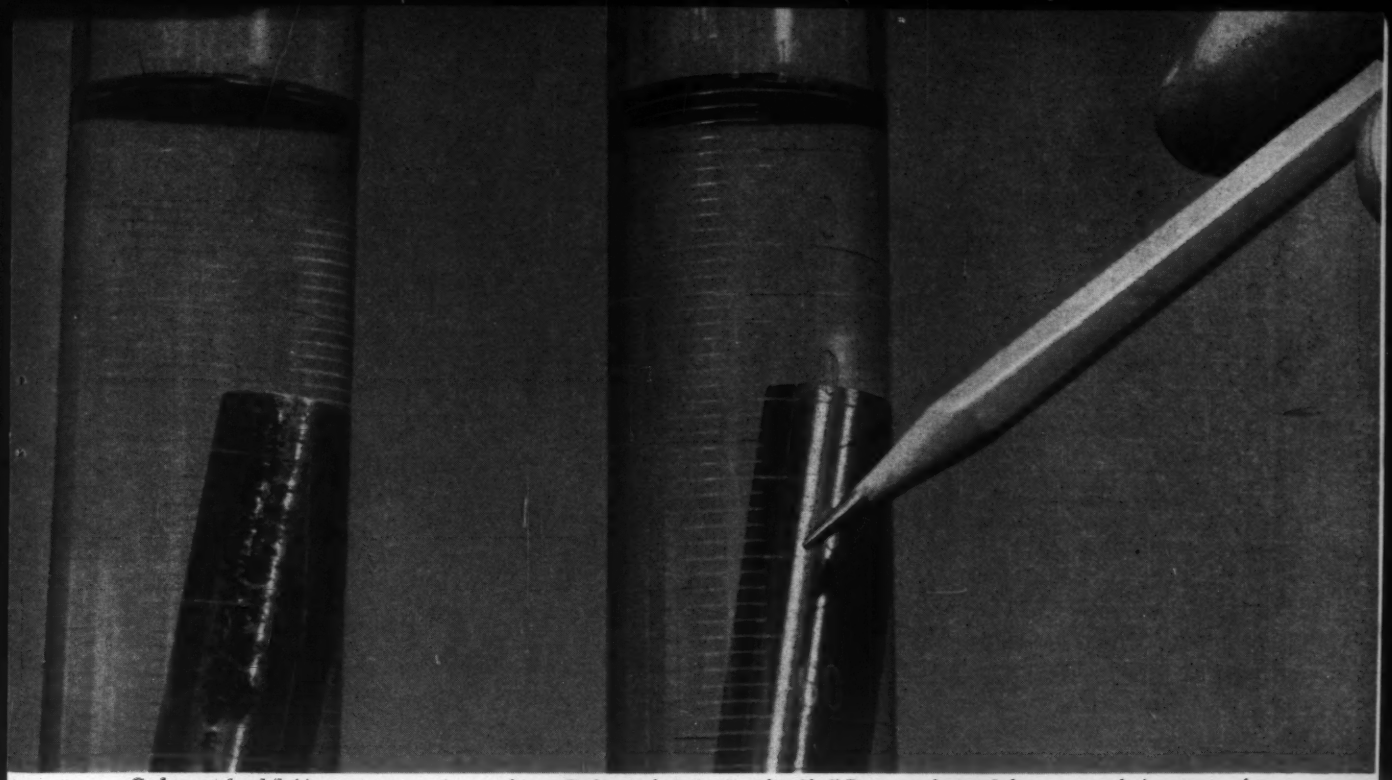
(3) **Stop insulating managers** and technical specialists against the hazards of decision-making.

(4) **Accelerate the pace** of technical and managerial innovations.

(5) **Cut out the nonsense** of subordinating necessary business and economical considerations for questionable social, psychological and sociological ideals.

(6) **Accept the fact** that price is a critical element in being "competitive."

(7) **Acknowledge the reality** of worldwide competition.



Carbon steel rod (left) rusts in water after two hours. Rod on right is immersed in Shell Dromus solution. It has not rusted after six months.

REPORT:

Shell reports on ten features of Dromus Oils that can help you reduce cutting time and costs

THE Shell family of Dromus® Oils includes both solution-type and emulsifiable cutting fluids.

Each Dromus product has its own area of application—depending on water hardness, metal characteristics and specific job requirements. However, the entire range of Dromus Oils offers these ten benefits:

1. Dromus Oils are concentrates. They are designed to be mixed with the proper quantity of water at point of use for optimum results.

2. Dromus Oil emulsions resist foaming even under most severe conditions.

3. Dromus Oils contain an effective germicide. Result: less danger of rancidity and bacterial growth.

4. Dromus Oils do not separate. Even when mixed into emulsions containing more than 50 parts' water, Dromus Oils maintain their stability.

5. Dromus Oils prolong grinding wheel life. They prevent the wheel from "loading up" with metal from the work.

6. Dromus Oils provide effective corrosion protection for tool and workpiece. (See photograph above)

7. Dromus Oils permit greater dilution than many soluble oils.

8. Dromus Oils wash away metal chips with high efficiency. Chips then settle out of the emulsion.

9. Dromus Oils can be kept in the machine during plant shutdowns.

10. Dromus Oils are made under strict controls. Manufacture of Shell Dromus Oils is scientifically controlled.

There is a Dromus Oil for your cutting, sawing, boring, threading, milling or grinding need. Call your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry.

Withdrawal of Prices Causes Rebar Uproar

For nearly three years the base price of reinforcing bars has remained unchanged.

Last week, U. S. Steel withdrew its rebar price. Confusion resulted. And IRON AGE has suspended publication of rebar prices.

■ Last week U. S. Steel Corp. threw the steel industry into an uproar by withdrawing its list price on reinforcing bars. For almost three years, the base price had remained at 5.675¢ per lb in most markets; some West Coast prices went as high as 6.425¢.

An exception, the Atlantic Steel Co. of Atlanta, had tipped off the unsteady price situation earlier this year when it had dropped its price to 5¢ per lb in the face of competition. This competition came from imports and small electric furnace mills which had been underselling the industry for months.

Shortly after the rebar move, the price of wire rope was dropped about 10 pct by major producers. These cuts followed closely earlier price cutting in stainless and linepipe.

Suspend Publication—The U. S. Steel move on rebar was followed closely by others in the industry. Some producers say their price stands at the old figure. However, with the major factors not quoting a list price, The IRON AGE has suspended publishing list prices of reinforcing bars (see p. 184).

Many people in the industry called U. S. Steel's action on rebar "unfortunate," "poorly timed," and in general disagreed with the move. But U. S. Steel contended the move only recognized a situation that had existed for months.

Negotiated Price—Actually, most rebar sold in the past six months has been sold on an inquiry basis for a specific job. One of the principal factors in knocking out the price has been the growth of integrated fabricators who have absorbed a large part of the rebar market. Another has been imports. Many mills have not had a significant rebar order in months.

Companies which take the bulk of the market have been buying on a negotiated price for some time. Most bars are bought cut to specific lengths and bent to fit specific jobs.

No Certain Price—According to sources, U. S. Steel considered the list price of rebar a fiction, because no rebar could be sold at that price. Nor was it even possible to come out with a new price because it was uncertain at what price mills could sell to fabricators.

Mills are still trying to find a realistic price. Early this week, some mills had yet to receive an inquiry and the industry was still trying to find the price level.

Steel Service Centers — "Many steel service centers are having the largest order count in their history now, but the tonnage hasn't gone up proportionately," says Robert G. Welch, executive vice president of the Steel Service Center Institute.

"But the business is turning up modestly and about 100,000 tons of inventory have been added to warehouse stocks since April 1—half of it since the beginning of May," he points out.

As of mid-June, warehouses had almost 3 million tons in stock (2,950,000), compared with the low point of 2.85 million tons on April 1. The all-time high was 3.8 million tons, reached last summer. This was 100,000 tons over the pre-strike level.

In the **Midwest,** some mild declines are reported by warehouses. But this is considered normal. Generally, the warehouse declines precede the seasonal mill dropoff. And June still looks as though it will be very good when stacked against any month last year.

Sheet and Strip — Orders were still coming in from automakers for June shipment after the month passed the mid-point. Steel salesmen in **Detroit** say there will likely be a decline in July shipments to the industry, however. Part of the July slowdown can be traced to the model changeover programs of the automakers. These start in mid-July. **Pittsburgh** mills also predict a slump in July, but late orders will determine how large the drop will be.

Strip is still a strong item in **Chicago.** This is attributed to the fact that some strip mills plan vacation shutdowns in July. Some customers in the Midwest report deliveries are easing. They are again shortening lead times on orders and pressing for fast delivery.

Tinplate — Orders for July are running behind the all-out levels of the last two months. A **Pittsburgh** mill says it still has room for a few more July orders. However, the real concern is the slowness with which can makers have been releasing shipments. And the gap between orders and releases is causing some uneasiness.

PURCHASING AGENTS' CHECKLIST

Concessions and price cutting have shaken the whole structure of steel prices. What's next? P. 88

Japanese ships are opening a direct trade route from the Midwest to the Far East. P. 94

New fabrication method slashes the cost of open-web beams. P. 129

COMPARISON OF PRICES

(Effective June 19, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	June 20 1961	June 13 1961	May 22 1961	June 21 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	June 20 1961	June 13 1961	May 22 1961	June 21 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti.	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$36.50	$36.50	$34.50	$30.50
No. 1 steel, Phila. area	39.50	39.50	39.50	33.50
No. 1 steel, Chicago	37.50	37.50	35.50	29.00
No. 1 bundles, Detroit	35.50	35.50	33.50	27.50
Low phos. Youngstown	40.50	40.50	39.50	34.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	49.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	51.50
No. 1 mach'y cast, Chicago	49.50	49.50	47.50	45.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$37.83	$37.83	$36.50	$31.00
No. 2 bundles	24.83	25.17	24.17	20.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	31.00	31.00	31.00	33.00
Copper, Lake, Conn.	31.00	31.00	31.00	33.00
Tin, Straits, N. Y.	112.50†	112.75**	101.625	101.50
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strip.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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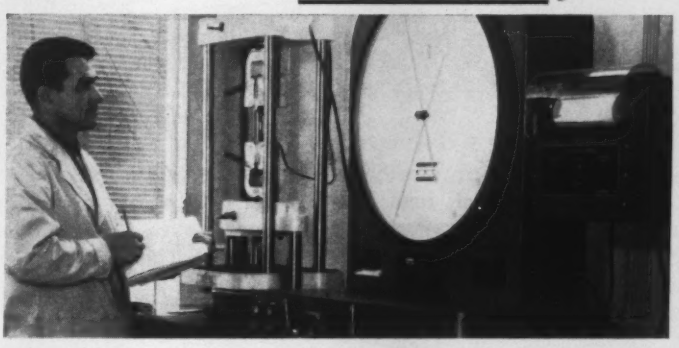

To continue with Ulbrich's policy of constantly giving customers more and better service Ulbrich has installed a fully equipped laboratory. After conversion of steel stocks to customer requirements, physical properties are checked on such equipment as a Tinius Olsen Tensile Machine, pictured above. Bend Test equipment, Rockwell Testers, a Kentron Micro-Hardness Tester and a complete chemical department supply time saving, accurate analysis and Quality Stainless Steel to *exact* customer specifications.

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Activity Dwindles, But Prices Hold

Despite a slackening of interest in scrap, prices are holding relatively firm. And scrapmen look for this pattern to continue through summer.

Reason: Reduced industrial offerings will offset reduced demand.

■ The scrap market remains relatively firm despite reduced activity. And it appears that this could be the case throughout the summer.

Scrapmen in many key areas expect reduced industrial offerings to offset the reduced demand. Therefore, prices should remain stable. In many areas—Cincinnati, New York, Pittsburgh, Chicago and Philadelphia—there is little or no new activity. But an undertone of strength still prevails.

However, reduced exports may hurt scrapmen. The Japanese probably won't buy as much tonnage during the third quarter as they did in the second period. And European interest for scrap this summer doesn't seem to be running high.

In Philadelphia, for example, more than 100,000 tons of scrap were sent overseas in May. Export shipments in the third period should fall far below this monthly rate. The same will be true on the West Coast where about one-third of the first half Japanese shipments originated.

Pittsburgh—Trading has come to a standstill again. Brokers say most prices are holding. But there is no new activity to test the market. The small amount of scrap ordered at the start of the month has been covered. There are no new orders locally and quotations for the Valley have fallen off. With mills heading for the July slowdown, scrapmen see little prospect of heavy buying in the near future. However, industrial offerings in July are relatively light. There is no indication the mills will push very hard for the limited supply. But brokers feel there will be enough demand to prevent a sharp break in prices in the better grades.

Chicago—The Midwest market marked time for another week while scrapmen waited for the new factory bundle lists. New sales, in small tonnages, continue to move at existing prices. A factory list, which had been expected to drop $2, came out at the strong prices reached earlier this month. Yards continue to lay down scrap. There is anticipation of a sharp drop of scrap intake during July and early August. Offers by mills to make purchases at reduced prices are not drawing much interest.

Philadelphia—There were several purchases by domestic mills this week at quoted prices. But tonnage was limited. Export shipments are still active, but outgoing tonnage is declining from the May high. A near-record 100,000 tons was shipped out of Philadelphia for overseas customers in May.

New York—The seamen's strike is having little or no effect on the scrap market in this area. Although the vast majority of the sales are for export, most of the shipments are on foreign vessels. The pace and tone of the market is unchanged. Most dealers remain fairly optimistic.

Detroit — July industrial lists come out next week. Thousands of tons less will be offered than in June. For this area the drop will possibly be 40 pct to 50 pct less than in recent months. A weakening export market is reported.

Cleveland—Prices are unchanged in a quite market. There are no new orders. On old orders, No. 1 grades are moving freely with no evidence of new strength or weakness. There are no quotations for No. 2 bundles. Brokers look for reduced industrial offerings to balance reduced demand and hold prices firm.

Cincinnati—There is no new activity, but an undertone of strength is reported. Dealers reason the lightness of industrial offerings will force mills to bid more for yard scrap. This optimism persists despite the prospect of curtailed steelmaking operations in July.

St. Louis—The market is steady. Everyone seems to have stopped looking for any rise in prices for at least another month or two. In fact, some scrapmen say a slight easing of prices might occur.

Birmingham—Despite an easing off of orders with the oncoming vacation schedules, there was a fair amount of buying this week. Prices advanced $1 a ton on some of the more active grades. Brokers say it's hard to tell which way the market will go.

Buffalo—Prices for cupola cast and machinery cast dropped $1 this week. Otherwise, the market remained quiet.

Boston—There is still very little activity in either export or domestic business.

West Coast—Prices remain stable. Although exporting is the main activity, the domestic mills are showing life again.

Houston—The situation remains unchanged with the district mill still cutting inventory. As a result, the market is in the doldrums.

The new generation of U.S. autos fends off corrosion . . .

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Use of galvanized steel sheets in the automotive industry has increased by more than 700% since 1954—and more automotive applications are on the way.

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divisions of
NATIONAL STEEL CORPORATION

SCRAP PRICES *(Effective June 20, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	37.00 to 38.00
No. 1 factory bundles	42.00 to 43.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	31.00 to 32.00
No. 1 RR hvy. melting	40.00 to 41.00
Scrap rails, random lgth.	46.00 to 47.00
Rails, 2 ft and under	50.00 to 51.00
RR specialties	43.00 to 44.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	100.00 to 110.00
430 bundles and solids	80.00 to 85.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	38.00 to 39.00
No. 1 factory bundles	43.00 to 44.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and turn.	18.00 to 19.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. forge crops	45.00 to 46.00
Low phos. punch'gs plate, ¼ in. and heavier	45.00 to 46.00
Low phos. 2 ft and under	42.00 to 43.00
No. 1 RR hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	47.00 to 48.00
Rerolling rails	58.00 to 60.00
Rails 2 ft and under	50.00 to 51.00
Angles and splice bars	45.00 to 46.00
RR steel car axles	59.00 to 60.00
RR couplers and knuckles	44.00 to 45.00
No. 1 machinery cast.	49.00 to 50.00
Cupola cast.	43.00 to 44.00
Cast iron wheels	35.00 to 36.00
Malleable	47.00 to 48.00
Stove plate	38.00 to 39.00
Steel car wheels	43.00 to 44.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	90.00 to 95.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 dealer bundles	42.00 to 43.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	13.00 to 14.00
Mixed bor. short turn.	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	26.00 to 27.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	43.00 to 44.00
Heavy turnings	27.00 to 28.00
RR specialties	42.00 to 43.00
Rails, 18 in. and under	52.00 to 54.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.50 to 41.50
Malleable	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	28.50 to 29.50
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	39.00 to 40.00
Rails, random length	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	31.00 to 32.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	38.00 to 39.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Low phos. plate	40.00 to 41.00

Cleveland

No. 1 hvy. melting	$34.50 to $35.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	34.50 to 35.50
No. 1 factory bundles	38.50 to 39.50
No. 2 bundles	22.50 to 23.50
No. 1 busheling	34.50 to 35.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft & under	39.50 to 40.50
Low pros. punch'gs plate	35.50 to 36.50
Drop forge flashings	34.50 to 35.50
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	39.00 to 40.00
Rails 2 ft and under	49.00 to 50.00
Rails 18 in. and under	49.00 to 50.00
Steel axle turnings	27.00 to 28.00
Railroad cast.	48.00 to 49.00
No. 1 machinery cast.	48.00 to 49.00
Stove plate	39.00 to 40.00
Malleable	51.00 to 52.00
Stainless	
18-8 bundles	170.00 to 175.00
18-8 turnings	100.00 to 105.00
430 bundles	70.00 to 75.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	37.00 to 38.00
Structurals and plate, 2 ft and under	39.00 to 40.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	43.00 to 44.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft	31.00 to 32.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	12.50 to 13.50
Shoveling turnings	14.50 to 15.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails, random lengths	39.00 to 40.00
Rails, 18 in. and under	44.00 to 45.00
RR specialties	40.00 to 41.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	32.00 to 33.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	55.00 to 56.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	38.00 to 39.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	43.00 to 44.00
Structural and plate, 2 ft.	42.00 to 43.00
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rail, random lgth.	41.00 to 42.00
Rails, 18 in. and under	46.00 to 47.00
Angles and splice bars	44.00 to 45.00
No. 1 cupola cast.	42.00 to 43.00
Stove plate	42.00 to 43.00
Cast iron car wheels	34.00 to 35.00
Unstripped motor blocks	31.00 to 32.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 2 dealer bundles	18.00 to 19.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	19.00 to 20.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	32.00 to 33.00
Drop forge flashings	32.00 to 33.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	31.00 to 32.00
Automotive cast.	40.00 to 41.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 31.50
No. 2 bundles	17.00 to 18.00
No. 1 busheling	31.00 to 31.50
Machine shop turn.	4.00 to 4.50
Shoveling turnings	8.50 to 9.00
Clean cast. chem. borings	14.50 to 15.50
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	31.50 to 32.00
Heavy breakable cast.	28.00 to 28.50

San Francisco

No. 1 hvy. melting	$41.00 to $43.00
No. 2 hvy. melting	38.00 to 40.00
No. 1 dealer bundles	.... 28.00
No. 2 bundles	26.00 to 27.00
Machine shop turn.	.... 17.00
Cast iron borings	.... 17.00
No. 1 cupola cast.	45.00 to 46.00

Los Angeles

No. 1 hvy. melting	$40.00 to $42.00
No. 2 hvy. melting	37.00 to 39.00
No. 1 dealer bundles	.... 29.00
No. 2 bundles	25.00 to 26.00
Machine shop turn.	.... 15.00
Shoveling turnings	.... 15.00
Cast iron borings	.... 15.00
Elec. furnace 1 ft and under (foundry)	.... 50.00
No. 1 cupola cast.	.... 46.00

Seattle

No. 1 hvy. melting	$42.00 to $44.00
No. 2 hvy. melting	38.00 to 40.00
No. 2 bundles	25.00 to 27.00
No. 1 cupola cast.	.... 36.00
Mixed yard cast.	.... 31.00

Hamilton, Ont.

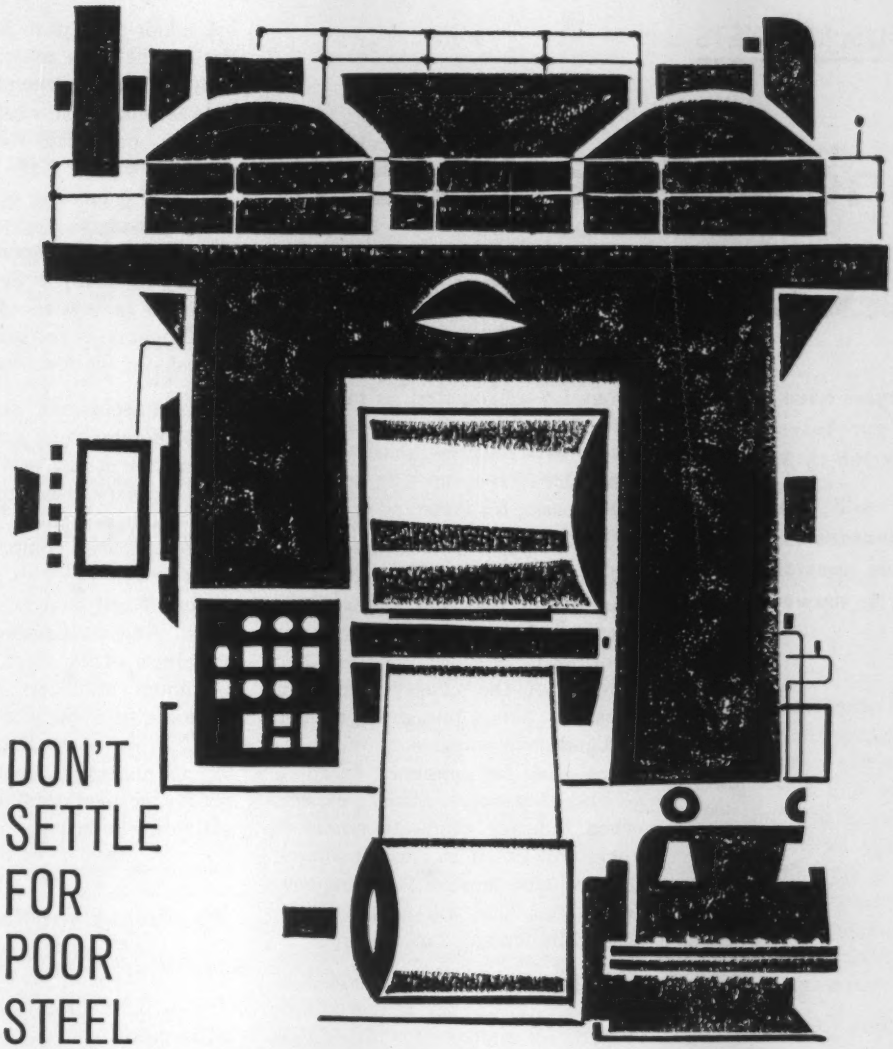
Brokers buying prices per net ton on cars:

No. 1 hvy. melting	.... $31.00
No. 2 hvy. melting cut 3 ft and under	.... 28.00
No. 1 dealer bundles	.... 31.00
No. 2 bundles	.... 21.00
Mixed steel scrap	.... 23.00
Bush., new fact., prep'd	.... 31.00
Bush., new fact., unprep'd.	.... 25.00
Machine shop turn.	.... 8.00
Short steel turn.	.... 12.00
Mixed bor. and turn.	.... 12.00
Cast scrap	.... 32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	.... $35.00
No. 2 hvy. melting	.... 31.00
No. 2 bundles	.... 24.00
Machine shop turn.	.... 8.00
Shoveling turnings	.... 11.00
Cut structural plate 2 ft & under	$45.00 to 46.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	29.00 to 30.00



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Japanese Need More U. S. Copper Scrap

Japanese buyers have been increasing their purchases of copper scrap from the U. S.

This trend will continue, rather than decrease. A Japanese nonferrous specialist now visiting the U. S. shows why.

Aluminum

■ U. S. copper smelters who have been concerned over the high level of exports of copper scrap to Japan may have to live with it.

There is more of the same coming. If anything, Japanese buying of U. S. scrap is more likely to increase, not decrease.

This is the picture painted by a Japanese specialist, now in the U. S. studying our nonferrous industry.

Decade Outlook—Over the next decade, the Japanese economy will grow at the rate of about 10 pct annually, he predicts. This means an equally steady increase in industrial and manufacturing facilities.

A major problem underlying this growth is a pending shortage of power. Development of hydroelectric power has top priority in Japanese planning.

Right now, hydroelectric projects and industry are taking all the copper Japanese smelters can make. And they will need more.

Costly Mines — The Japanese have very limited and very high-cost copper mines. They must go outside the country for raw materials.

The Japanese nonferrous specialist figures about 2 million tons of ore and concentrates are mined and produced in the world each year. About 1.6 million tons go to traditional users. Japanese copper producers need a great share of the remainder to keep up with demand.

It is easier for them and generally cheaper, to buy scrap.

Durable Factor — There's another factor that will increase the Japanese demand for copper scrap from the U. S.

Most of the copper mined in Japan is going into hydroelectric and industrial expansion. Very little is going for consumer durables.

The Japanese official expects when industry nears its potential, there will be an increase in output of consumer durables for home consumption. This will assure an increase in demand for copper.

Import Duty—There is now a 10 pct duty on copper imported into Japan. A source says the U. S. government will suggest that it be reduced very shortly.

If this is done, it will help take the strain off the current copper scrap market. Copper prices in Japan are about 5¢ over the world price.

The effect of Japanese scrap buyers on the U. S. market is well illustrated by a recent release from the Dept. of Commerce. It notes that from January, 1960, through February, 1961, monthly exports of U. S. copper-base scrap to West Germany averaged 2600 tons, and to Japan, 8500 tons.

In March, shipments to West Germany dropped to 1700 tons, then to 1000 tons in April.

Shipments to Japan rose to 10,600 tons in March, and soared to 11,400 tons in April.

A major attempt to heal strained relations between major aluminum producers and independent extruders was made last week by D. A. Rhoades, president, Kaiser Aluminum & Chemical Co.

He told a meeting of the Aluminum Extruders Council: "We've had our policy differences in the past; but I really believe that this is largely a matter of occasional unwillingness to recognize some of the facts of life for what they are."

The Facts — Mr. Rhoades says profit margins and rate of return on investment just won't permit the lower primary prices that extruders have been demanding.

He says his company made a profit of 2.87¢ per lb of aluminum produced and sold in 1960, before taxes. And he figures the average net return of the three major U. S. aluminum producers on their investment in 1960 was between 2.8 and 2.9 pct, compared with 4.9 pct for all nonferrous metals, and 5.5 pct for the total durable goods manufacturing industry.

Tin Prices for the Week

June 13 — 112.50; June 14 — 112.25; June 15—112.125; June 16—112.50; June 19—112.50*.

*Estimate.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	31.00	30.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium ingo	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/58
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% ingot. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco, Tex. **NICKEL:** Port Colborne, Canada. **ZINC:** prime western. Other primary prices, pg. 181.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	163.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	102	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	125	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	.....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Red	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Munts Metal	51.94	.....	47.25	.....
Comm. Bz.	54.73	55.02	54.67	59.34
Mang. Bz.	57.71	61.54	51.27	.....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod 34.77

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base .... $ 1.31
Cobalt, 97-99% (per lb) ..$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz. ....$75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury dollars per 76-lb flask f.o.b. New York ..... $200 to $204
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz..$24 to $26
Platinum, dollars per troy oz. .$82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 32.00
- No. 120 ..... 31.25
- No. 123 ..... 30.50

80-10-10 ingot
- No. 305 ..... 36.00
- No. 315 ..... 33.75

88-10-2 ingot
- No. 210 ..... 43.75
- No. 215 ..... 40.50
- No. 245 ..... 35.75

Yellow ingot
- No. 405 ..... 27.50

Manganese bronze
- No. 420 ..... 30.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 23.75-24.25
- 0.60 copper max. 23.50-24.00

Piston alloys (No. 132 type)..25.00-26.00
No. 12 alum. (No. 2 grade) ...21.75-22.25
108 alloy 22.25-22.75
195 alloy 24.75-25.75
13 alloy (0.60 copper max.)...23.50-24.00
AXS-679 (1 pct zinc) 22.00-23.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.25-24.25
Grade 2—92-95% 22.00-23.00
Grade 3—90-92% 21.00-22.00
Grade 4—85-90% 20.00-21.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅝	18½
Red brass	23⅞	23⅛
Comm. bronze	24⅝	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 28⅛
No. 2 copper wire 26⅛
Light copper 23⅞
*Refining brass 24⅞
Copper bearing material 23⅞
*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 28⅛
No. 2 copper wire 26⅛
Light copper 23⅞
No. 1 composition 23¾
No. 1 comp. turnings 23¼
Hvy yellow brass solids 18½
Brass pipe 17½
Radiators 19

Aluminum

Mixed old cast. ..... 12½—13
Mixed new clips ..... 14½—15
Mixed turnings, dry ..... 13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 24¼—25
No. 2 copper wire ..... 22½—23
Light copper ..... 20 —20½
Auto radiators (unsweated). 16½—17
No. 1 composition ..... 21 —21¼
No. 1 composition turnings.. 20½—20¾
Cocks and faucets ..... 17 —17½
Clean heavy yellow brass ... 14½—15
Brass pipe ..... 17 —17½
New soft brass clippings .... 18 —18½
No. 1 brass rod turnings .... 16½—17

Aluminum

Alum. pistons and struts .... 7 — 7½
Aluminum crankcase ..... 9½—10
1100 (2s) aluminum clippings 12¼—12¾
Old sheet and utensils ..... 9½—10
Borings and turnings ..... 4½— 5
Industrial castings ..... 10 —10½
2020 (24s) clippings ..... 11 —11½

Zinc

New zinc clippings ..... 5½— 5¾
Old zinc ..... 3½— 4
Zinc routings ..... 1¾— 2
Old die cast scrap ..... 1¾— 2

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 23-23.50
Clean Monel turnings 16.50-17
Old sheet Monel 22-23
Nickel silver clippings, mixed. 18
Nickel silver turnings, mixed. 15

Lead

Soft scrap lead ..... 7¼— 7¾
Battery plates (dry) ..... 3 — 3¼
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 81 —82
No. 1 pewter ..... 61 —62
Auto babbitt ..... 45 —46
Mixed common babbitt ..... 10 —10½
Solder joints ..... 15 —15½
Small foundry type ..... 9 — 9½
Monotype ..... 9¼— 9¾
Lino. and stereotype ..... 8½— 8¾
Electrotype ..... 8 — 8¼
Hand picked type shells .... 5¾— 6¼
Lino and stereo. dross ..... 1¾— 2¼
Electro dross ..... 2½— 3

(Effective June 19, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective June 19, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Cokes▲ *1.25*-lb. base box	Electro▲▲ *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*					7.525 *B3*	9.275 *B3*	6.40 *W6*	†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. ▲ COKES: 1.50-lb. add 25¢. ▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*					7.575 *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*					7.575 *U1*	9.325 *U1*			$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*		6.775 *B3*		7.525 *B3*	9.275 *B3* 10.025 *B3**	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*		6.775 *A7*		7.525 *A7*			Hollowware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3*	7.50 *C19*								
	Chicago, Joliet, Ill.	5.10 *W8, A1*						7.525 *U1, W8*		6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*		7.65 *R3*	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*	6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*					7.525 *G3*	9.275 *G3*				
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*		6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*	6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1 Y1,*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*				7.225 *E2*						
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	7.225 *A7*	6.775 *A7*	7.225 *A7*						
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3*	7.65 *R3*	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*			$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3*	7.50 *E3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3* 10.125 *U1, J3**	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5*	7.50 *W3*		7.225 *W3*	7.525 *W3*	9.275 *W3*		$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*			6.775 *Y1*		7.525 *Y1*	9.275 *Y1*	6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*					8.25 *K1*	10.40 *K1*		$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*		6.775 *T2*				6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

▲ Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective June 19, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.		Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries. (See page 174.)		6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*		7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				*
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R5,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective June 19, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
C19 Canfield Steel Co., Canfield, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 regs)	Galvanized (10 regs)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	7.87	9.71	10.16	11.35	9.70	9.95	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.59	9.45	8.41	8.47	8.26	13.14	16.76	16.65	.....	.....
Boston**	.10	10.00	11.20	11.87	12.50	9.95	10.60	10.15	13.45	17.79	16.69	21.89	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35[3]	10.23	7.91	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	11.20	12.20	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.13	10.50	10.95	11.44	9.47	9.82	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.84	17.24	16.24	21.24	20.49
New York**	.10	10.17	10.88	11.45	12.47	10.32	11.00	10.54	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.90	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		9.45	11.30	12.35	12.40	10.55	11.00	9.45	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75[2]	11.95	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	18.00	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.73	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	9.72	10.39	11.54	11.89	9.56	10.07	9.72	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13c zinc. [2] Deduct for country delivery. [1] 15 ga. & heavier; [3] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective June 19, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

f.o.b. mill

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective June 19, 1961)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25–26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00–31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25–29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	.....	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2**	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
Sparrows Pt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50								
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50								
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Fontana *K1*	+6.25		+2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50								
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

Established 1866

IMAGINATION IN PERFORATED MATERIALS

New materials, new techniques have opened broad horizons for perforated materials in industrial design.

Texturing of perforated metals offers a dramatic opportunity to increase visual appeal while adding structural strength.

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Rear-pump body for automatic transmission cast from gray iron using shell-molds and -cores.

modern shell-mold casting for:

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Size and location of the oil ports in the pump body illustrated are maintained within *a tolerance of 0.015 inch* by using shell-cores.

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Faithful reproduction obtained with shell-molds, and the absence of burnt-in sand reduce the amount of machining and finishing required.

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FERROALLOY PRICES

NOTE: Prices of Boiler Tubes, Clad Steel, C-R Spring Steel, Electrical Sheets, Electrodes, Electroplating Supplies, Metal Powders, Rails and Track Supplies, and Refractories are published in alternate issues.

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si... 26.00
4-6% C, 58-63% Cr, 3-6% Si..... 22.50
5-8% C, 58-63% Cr, 3-6% Si..... 22.50
6-8% C, 50-56% Cr, 4-7% Si..... 22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si.. 28.75
0.025% C (Simplex) 31.50
0.010% C max, 63-66% Cr, 5-7% Si. 32.50
0.010% C max, 68-71% Cr, 2% Si max 31.50
0.25% C max 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.)
Carloads, delivered, lump, 3-in x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	22.50	14.60
Ton lots	30.45	16.05
Less ton lots	33.40	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Ca, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19%	.. $98.00	$96.00	$100.50
19-21%	.. 100.00	98.00	102.50
21-23%	.. 102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	(Bulk) 37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe ..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	13.50	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb
Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Vanadis, O., O., freight allowed, ton lots, per lb contained Ti $1.35
Less ton lots (200 lb and up) $1.37

Ferrotitanium, 30% low carbon, 0.10% C max., 27-32% Ti, Vanadis, O., freight allowed, per lb contained Ti, ton lots $1.35
Less ton lots (200 lb and up) $1.40

Ferrotitanium, 1-3% Carbon, 17-20% Ti, f.o.b. shipping point, freight allowed, carload per net ton $250.00
Ton lots $260.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

(Effective June 19, 1961)

Why Advertise At All?*

A new approach to the job of increasing sales effectiveness... which challenges everyone who has a sales responsibility.

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Beginning with the question, "Why advertise at all" the new approach goes on to firm up your company's or client's total market objective. It indicates how non-personal sales dollars can be stretched by applying sales effort with maximum efficiency. And to a major degree, it answers the basic question, "How should I allocate my sales budget for greatest effectiveness?" All in *actual figures*, pertinent to the *specific company*, which you insert in an easy-to-use workbook.

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1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
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2	500	G.E.	TS 7569	2200	1200
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1	250	Cr. Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1890
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	IM	2200	580
1	200	G.E.	IM	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
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1	300	Cont.	NL-6868	440	1780
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1	300	Whse.	CS-1002	2300	580
1	250	Whse.	CS-8758	2200	1775
2	200	Whse.	CS-8558	220/440	1750

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Detroit Market Is Stabilizing

Used machinery dealers in the Detroit area say it now appears that prices are stabilizing for the second half.

Interest is centered in good tool room equipment.

■ As the second half of 1961 approaches, these trends seem to be forming in Detroit's used machinery market:

(1) Small and medium size shops are expressing renewed interest in tool room equipment.

(2) Auction and dealer prices are stabilizing.

(3) Inventories are continuing at a high level in dealer warehouses, although isolated cases of stock replenishing are showing up.

(4) Exports are waning slightly, but still are an important factor at larger dealerships and auctions.

Dealers disagree on the outlook for the rest of 1961. Some say "fair." Others say "terrific." January and February were not strong months in general. Events brightened in March and April. It's on May and June that opinions vary most.

Tool Room Sales—"We've been fortunate," claims a dealer in suburban Detroit. "Last year at this time business was mediocre. Then we really started concentrating on selling tool room goods such as broaches and cutting shears. We've found a demand for these items, especially from smaller customers who seem to be showing some new vigor."

A specialist in cranes sees gains through the rest of the year as prospects begin shaping up.

Most others are less optimistic. One who takes a "so-so" attitude says his business at best has been paralleling the national rate of used machinery sales. But he points to a lull in May and June which he "can't put his finger on."

Not Optimistic — Says another: "We've had good and bad months this year. Right now things aren't so good."

Prices in Detroit are firm, following a round of price cuts earlier in the year. Dealers claim machinery users still are willing to pay a top price for a good machine at auctions. And dealer prices are doing well, too. But there is some feeling that prices could fall unless business gains.

The South is showing some interest in the Detroit market. One dealer estimates 50 pct of his sales are heading southward, mainly to Tennessee and Alabama. Others report Florida dealers are buying. There aren't too many reports of sales to Detroiters, although Michigan areas outside of Detroit are buying.

Punch Presses — Southerners mainly are interested in medium-priced equipment. Punch presses are one of their favorites.

Although overseas buyers are still in the market, they are not in as heavily as a year ago. One dealer points out Brazil especially has tightened up on licenses. But other countries are continuing to shop the Detroit market.

Inventories are high at many dealerships. In some cases, they're 25 to 30 pct higher than normal. "We're filled up on miscellaneous machines such as punch presses, drill presses, grinders and shapers," says a heavily loaded dealer.

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DIAMETER OF RAM 62"
STROKE OF RAM 40"
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110 Ton Cleveland Ladle 48'5" Span
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HP	Type	Speed	Winding
150/200	MDS418AE2	400/730	Series
75	MD414AE	274/475	Series
45	MD410AE	172/550	Comp.
35/45	MD410AE	132/525	Series
33	MD408AE	126/625	Comp.
15/19	MD406AE	59/650	Series
5	MD403AE	21/700	Comp.
3	C01822	875	Series

ELECTRIC BRIDGE 230V. D.C.

Traveling on Rail, 230' Span, plus 80' Cantilever, 6 Ton Bucket, Single Trolley, Motor Driven

CARS

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50 Ton Slag Std. Ga. w/300 Cu. Ft. Ladles (2)
50 Ton Slag Std. Ga. w/260 Cu. Ft. Ladles (2)

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Penna. HAMMERMILLS SX13 400 HP (3)
Koppers 2 Roll CRUSHER 36"x42" 40 HP
50 Ton 60' Platform Printomatic TRUCK SCALE
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1054#	2 7/16"	Rd. x 16'	M-1010
2253#	2½"	Rd. x 15'	C-1053
58380#	2⅝"	Rd. x 12-20'	C-1045
950#	3⅛"	Rd. x 16'	A-4340 Ann.
3518#	3⅛"	Rd. x 13' 8"-16'	A-8620H
3000#	3½"	Rd. x 8-14'	C-1040
1844#	4¾"	Rd. x 12-13' 7½"	C-1018
3300#	5"	Rd. x 8-10'	A-4320
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6400#	8 Ga.	x 2½" x 16'	C-1010 P&O
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16000#	⅛	x 1¼" x 12-16'	Mild P&O
1800#	⅛"	x 4¾" x 12'	35/45 Car
5400#	3/16"	x ½" x 83-124"	P&O

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3200#	5/16"	x ¾" x 16-20'	Mild
3800#	5/16"	x 1" x 14-16'	C-1095
7700#	11/32"	x 2½" x 20-22'	C-1040
4300#	5/16"	x 2½" x 14' 10"	C-1095
3800#	5/16"	x 3" x 20'	C-1085
1000#	5/16"	x 3½" x 17' 4"	C-1050
1400#	5/16"	x 4" x 16' 4"	C-1050
1100#	5/16"	x 5¼" x 112"	Mild
1900#	⅜"	x ⅞" x 16' 6"	C-1035
18000#	⅜"	x 3¾" x 16' 6"	M-1025
9000#	¾"	x 4" x 11' 10"	C-1060
5000#	⅜"	x 7¼" x 15' 8"	M-1025
14800#	1⅝"	x 25½" x 102"	C-1045

HOT ROLLED FLATS

2700#	7/16"	x 2¼" x 15'	C-1070
780#	½"	x 1" x 16' 2"	C-1035
1800#	9/16"	x 1½" x 15' 10"	Mild
1200#	⅝"	x 2½" x 15'	C-1045
3000#	⅝"	x 5" x 16'	40/50 Car.
8400#	⅝"	x 8½" x 16'	Mild
6960#	11/16"	x ¾" x 10'	Mild
5400#	¾"	x 4¼" x 16' 6"	M-1025
4400#	¾"	x 4½" x 16' 2"	C-1050
6600#	¾"	x 4½" x 14' 2"	Manten
15000#	¾"	x 5¼" x 6-14'	C-1045
5100#	⅞"	x 1¾" x 13-15' 7"	C-1045
5800#	⅞"	x 2" x 15' 2"	C-1050
15000#	⅞"	x 3½" x 12-16' 3"	M-1025 REOA
3100#	1"	x 2¼" x 12-15'	C-1050
800#	1"	x 2½" x 14' 6"	C-1070
8200#	1"	x 2¾" x 15' 9"-18' 5"	Mild
1300#	1"	x 5" x 15' 4"	C-1080
7500#	1"	x 8" x 8'	M-1015
2900#	1⅛"	x 6½" x 9' 5"	Mild
16000#	1½"	x 4" x 15' 6"	C-1045
5600#	1¾"	x 6" x 10-18'	Mild
8800#	2"	x 6" x 18'	C-1050

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40000#	6"	x ¾" x ¾" x 17'	SAE 1020

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2800#	2⅛"	x 1 3/32" x ⅛" x 43½"	Rail

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3800#	⅜"	x 10" x 8'	Mild
4000#	⅝"	x 48 1/16" x 96"	C-1095
14000#	1⅝"	x 25½" x 102"	C-1045

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32000#	10"	x 29# WF x 20-40'

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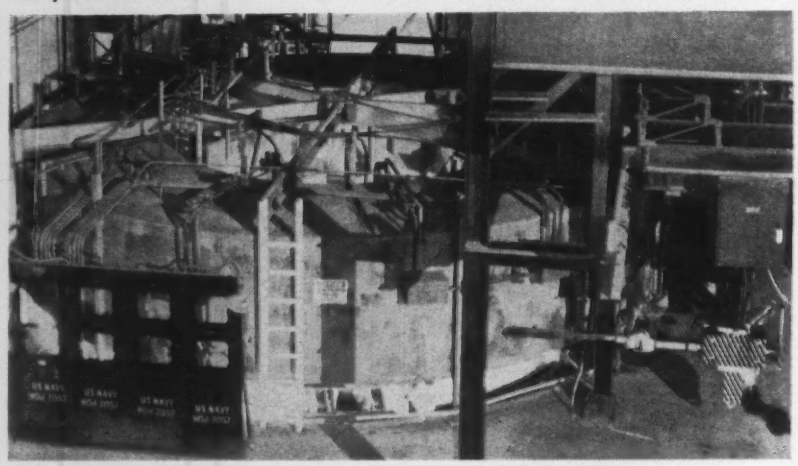

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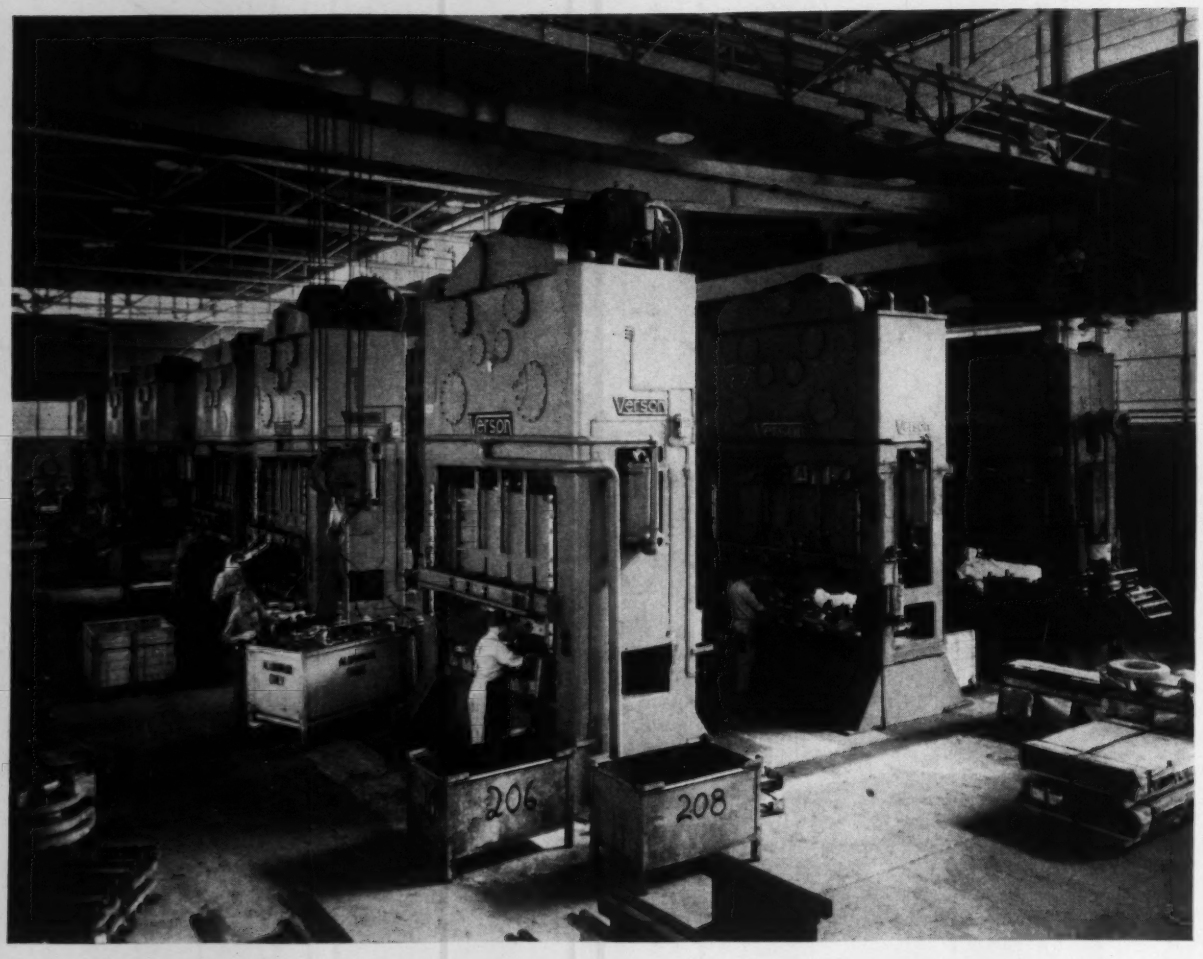

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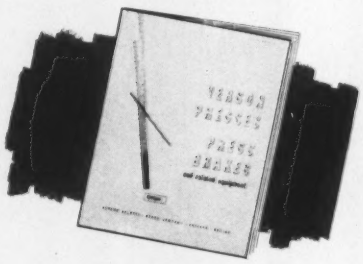

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